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WORKS BY MR. B. G. A. MOYNIHAN

Retroperitoneal Hernia. London, 1899

Bailliere, Tindall & Cox

**The Surgical Treatment of Gastric and Duodenal
Ulcers.**

W. B. Saunders & Co., 1903

Gall-Stones and their Surgical Treatment

Second Edition, 1905

W. B. Saunders & Co.

Abdominal Operations

Second Edition, 1906

W. B. Saunders Company

Duodenal Ulcer. W. B. Saunders Company, 1910

Pathology of the Living and other Essays. W. B.
Saunders Company, 1910

WITH MR. MAYO ROBSON

Diseases of the Stomach. Second Edition, 1905

Diseases of the Pancreas. W. B. Saunders & Co.

1902

THE
PATHOLOGY *of the* LIVING

AND OTHER ESSAYS

BY

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LEEDS



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Preface.

IN this volume are included a number of essays which have appeared in various medical journals during the last few years. Their republication in this form has been sanctioned at the request of many of my friends. I should perhaps have been a little diffident about the wisdom of this course if I did not feel that, however imperfectly, some of these papers present a fresh, perhaps even a new, view of many of the problems which are at present engaging the attention of the surgeon.

The time has come, I think, when the surgeon must cast off some of the shackles by which he has been fettered for so many years. When research into the conditions within the abdomen has been conducted during the course of an operation, the fruits have been judged by the standard set up by the disclosures and by the statistics of the post-mortem room. Differences often of the gravest significance between the evidence offered by the two modes of investigation have not been co-ordinated, or even compared; they have been contrasted to the detraction and the detriment of the

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surgeon's work. His enquiry has been reckoned as valueless in so far as it opposed the doctrines held as sacred by the pathologist. No recognition has been accorded to the truth that in almost every particular the value of evidence obtained from the living outweighs that which is disclosed upon the post-mortem table.

It is not alone in respect of the pathological changes discovered in the conduct of an abdominal operation that a new knowledge is growing up, but also in reference to the clinical manifestations that are attached to these structural changes. The literature of medicine has been too much concerned with terminal events. It is necessary for us now to devote our closest inquiry to the very earliest disturbances of health so that medical treatment of a condition whose authentic nature is known may be more purposeful, and surgical treatment, when necessary, adopted at an earlier, and in a safer, stage. One result of the great increase in the number of abdominal operations in recent years is that the organic diseases affecting the several viscera are being recognised in earlier stages, and that the symptoms aroused in these stages are being given a proper interpretation. Another result is the lessening of the number of so-called "functional diseases" by a recognition of the fact that they are chiefly

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dependent upon demonstrable changes in structure. If the works of medicine of a quarter of a century ago are examined, it will be realised that a very great majority of the cases of "dyspepsia" were then attributed to functional derangements. We now know that among the conditions so described were many organic diseases, such as duodenal ulcer, some of the forms of cholelithiasis, and last, but certainly greatest, chronic appendicitis. I believe that time will shew that possibly all, certainly nearly all, of the cases of protracted and recurring "dyspepsia" are due not to vices of secretion, though indeed these may be present, but to organic changes in one or other of the viscera. What a world of observations have been conducted upon the changes in the quantity and quality of the gastric secretions! Yet all the while the stomach was weeping only because of, and in sympathy with, the damage unceasingly inflicted upon other parts. It is all as though one should attempt to discover the place and the nature of a foreign body in the eye by an examination of the tears that flow so freely.

B. G. A. MOYNIHAN

33 PARK SQUARE, LEEDS
St. Patrick's Day, 1910

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AN ADDRESS

ON

The Pathology of the Living.*

DELIVERED BEFORE THE ASHTON-UNDER-LYNE DIVISION OF THE BRITISH MEDICAL ASSOCIATION AT
THE OPENING OF THE WINTER SESSION
ON OCTOBER 18, 1907.

MR. PRESIDENT AND GENTLEMEN: When I had the honour of receiving your most cordial invitation to open the winter session of this Division of the British Medical Association, the thought came to me that I might perhaps be able to interest you by an endeavour to show in what manner our knowledge of the pathology and treatment of abdominal diseases had been modified and enlarged by the work of the surgeon. Those among us who can carry the mind back twenty years or thereabouts will remember that practically all the knowledge we then possessed of the diseases having their origin within the abdomen was based upon clinical observations of the symptoms and signs

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which the patient displayed during life, and the pathological evidence revealed upon the post-mortem table. At the present time, however, as a result of the enormous increase in the number of abdominal operations, a third and most fertile source of information has been disclosed to us. During the conduct of such an operation not only are the parts immediately concerned in the operation laid bare, but other organs also are exposed to our scrutiny and investigation, with the gradual result that we have been enabled to construct a pathology of the living as contrasted with the pathology of the dead. It is of the value of this pathology of the living and of its influence upon our powers of diagnosis and of treatment that I wish more especially to speak to-night.

I can well remember the time when the risks of an abdominal operation were very considerable. When I was first a resident in the Leeds Infirmary there was a long period in which approximately two-thirds of all the patients died after abdominal section had been performed upon them. The record of a year's work was not then a chapter of great surgical achievements; it was a martyrology. This was, in part, due to the large proportion which the desperate, the "too late," cases of obstruction and similar troubles bore to the total number of operations; in part, also,

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no doubt, to the fact that in surgery, as in all the arts, the hand of the beginner is heavy. It was in those days not an uncommon experience for the surgeon who recorded the discovery of certain pathological states during the operation to be held up to good-humoured derision by his colleagues, or the residents, when the post-mortem examination disclosed a state of affairs supposed to be entirely at variance with these. It never seemed to occur to us that the post-mortem evidence was perhaps of far less value and significance than that which had been furnished during the life of the patient. Yet it is a fact hardly to be questioned that there is often a greater change in the naked-eye appearance of the parts within the abdomen after death than there is in the expression of the face. The features of a man in health change greatly when death comes, and these changes have their counterpart elsewhere.

The knowledge gleaned upon the operation table has shown that at least no small part of the post-mortem room pathology is in value insignificant as compared with the pathology of the living. This is, indeed, only what might reasonably be expected. If a patient is suffering from a certain disease, say of the stomach or gall-bladder, it is of greater import and of greater service to us to see the exact pathological conditions

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present at the moment of his illness than it could be to see the same parts months or years afterwards, when unalterable changes, extensive advances, and perhaps a terminal infection, have been added to that early simple condition which first disturbed the patient's health. It is more important for us to know the pathological conditions which cause a patient's present sufferings—a pathological change which is, perhaps, remediable—than it is to know the fullest particulars of that unhindered morbid change which has at last caused death. Our chief purpose is to heal the living.

A point in reference to the value of post-mortem pathology is, it seems to me, too constantly overlooked. The evidence furnished in a series of years in the post-mortem room of a general hospital upon any subject is of enormous value; that no one disputes. But the value is necessarily a limited one. To take an example: In a recent discussion¹ Dr. Hale White briefly reviewed the cases in which gall-stones had been found on post-mortem examination during twenty-five years at Guy's Hospital. Within this period 11,031 autopsies had been performed, and gall-stones were found in 333 cases. There are probably few hospitals where so many post-mortem examinations are made as at Guy's, and it is doubtful if there is one where they are made

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with greater care or accuracy. Yet the first thought that occurs to one is that the accumulated experience of all these years at this great hospital is very meagre. The total number of cases in which gall-stones or their complications were found is small: a great deal smaller, for instance, than the number of cases that have been operated upon by a few individual surgeons. In mere quantity, that is to say, the entire post-mortem experience of this great hospital in twenty-five years is less than the experience of a single surgeon during, say, five or ten years. In actual value the former cannot be compared with the latter. For however carefully the anamnesis of the dead patient may have been taken, his personal contribution to our knowledge is a final and completed thing, amenable to no revision. The surgeon, on the other hand, happily, is able to co-ordinate the details of the patient's history, amplified and more closely scrutinised, if need be, after the operation, with those morbid changes of which the operation has made him fully cognizant. If a single observer had been present at every autopsy at this hospital during all these years (an impossible assumption), his experience would have a less solid foundation in essential facts and observations than that of many surgeons who are now daily engaged in the treatment of patients suffering from this disease. It seems to

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me indisputable that the evidence which can be adduced from the post-mortem records of any hospital, however long the period chosen, in respect of gall-stone disease, of diseases of the stomach, or of the pancreas, or intestines including the appendix, is inconsiderable in quantity and insignificant in value when compared with that which is now available upon the operation table. For it is, I think, reasonable to assert that patients do not commonly die in hospital as a result of the diseases from which they suffer protractedly during life. The occurrence of an autopsy in hospital upon a patient who has died of calculous obstruction of the common duct may be a rare event—one case in forty years at Guy's Hospital. In my own work such a case is now seen upon the operation table on an average once in ten days. The death in hospital of a patient who has at any time suffered from gall-stone disease is evidently rare, for in twenty-five years at Guy's Hospital only 333 cases were seen. In six years I have myself seen a larger number than this of patients who were so seriously troubled by this disease that operative treatment was necessary, and Drs. W. J. Mayo and C. H. Mayo, of Rochester, have together operated upon over 1,500 cases. Again, I could quote more than one eminent physician who considers that death from hæmorrhage in cases of gastric or duodenal ulcer

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is extremely rare, because in all his hospital experience no such case had been known. Yet a little reflection will show that it is hardly to be expected that such cases would be admitted to hospital. Neither hæmorrhage nor perforation occurs except in rare instances when the patient is under treatment in hospital. Within the last twelve months I have seen three patients suffering from chronic ulcer, in two cases in the duodenum, in one in the stomach, who, while awaiting operation, bled to death before they could be admitted into hospital. It is, therefore, hardly necessary to point out that opinions, at times so confidently expressed, which are based only on post-mortem experience, which take no account of the sufferings or of the morbid changes in the living, and which show no acquaintance with the risks and results of operative treatment, can make no claim upon our acceptance nor any serious demand upon our consideration.

DISEASES OF THE STOMACH AND DUODENUM.

But my chief purpose is not merely to endeavour to adjust the relative values of the evidence derivable from the dead and from the living, but to attempt to show what are the contributions which have been made by the surgeon to the science of medicine by his study

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of the pathology of the living. Let me take the diseases of the stomach first. The work of the surgeon has, I think, shown that chronic ulcer of the stomach or of the duodenum is a far more common disease than was formerly believed, and that a very large number of the protracted or recurring cases of indigestion are due to its presence. It is no long time since most of the symptoms due to ulcer were attributed to vices of secretion, to excess or deficiency of hydrochloric acid in the gastric juice, and so forth. But exploration of the abdomen has shown that the part played by these factors in the type of case I have mentioned is so small as to be almost negligible. With regard to duodenal ulcer, it is hardly an exaggeration to say that nothing was known of its symptomatology, and very little could be done for its relief until the surgeon had realised its frequency and had shown in what manner the patient could be cured. In the text-books, or special medical works on the subject, duodenal ulcer is considered an infrequent disease, and one very difficult of recognition. Both Riegel² and Ewald³ give such meagre descriptions of duodenal ulcer that it is quite certain that the characteristic clinical picture of this malady is unknown to them, and the opportunity of co-ordinating the anamnesis with the living pathology in a case of duodenal ulcer has probably not occurred

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to either of them. The work of the surgeon has shown that duodenal ulcer is a common disease; I have myself operated upon 150 cases. In my last published paper I showed that the proportion of gastric to duodenal ulcers in my own cases was exactly as 2 to 1. Yet since then the proportions have altered, and recently I have operated oftener for duodenal than for gastric ulcer. Many of the ulcers which were supposed to be pyloric or in the stomach close to the pylorus we now know to be in the duodenum. To tell exactly whether an ulcer is gastric or duodenal is not always quite easy; a careful examination of the whole area must be made, and the venous ring which usually marks the site of the pylorus defined. By multiplying these careful examinations we have come to realise that duodenal ulcer, at least in the cases that come to the surgeon for treatment, is almost, if not quite, as frequent as gastric ulcer. And little by little the clinical picture has become complete, and a diagnosis of ulcer can now be made with reasonable certainty from the anamnesis alone. This is usually the story the patient tells: After food is taken the patient is free from pain; the period of an hour or two which follows a meal is the best time in the day. At a time varying from one and a half to four hours after the meal a sense of uneasiness is noted in the upper part

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of the abdomen.* A burning, gnawing sensation develops, and there is a bitter taste in the mouth, with, it may be, eructations of food or gas, bitter and acid in taste. The pain, which gradually increases, may be relieved, often considerably, by belching or by pressure. As it increases in severity it strikes through to the back, to the right of the middle line, and it may radiate round to the right side of the chest. As all patients discover for themselves, the taking of food relieves the pain, so that many carry a biscuit in their pockets, or take milk, a dose of an alkaline medicine, or some form of food, as soon as the uneasiness develops. In several cases upon which I have operated the pain has been more severe than this—has been, in fact, indistinguishable from a mild form of hepatic colic; the patient described the pain, which comes constantly two or three hours after food, as a “colic” or a “spasm.” It is not improbable that a spasm of the pylorus is actually present, for such a condition may subsequently be seen during the course of an operation. The pain, it will be noticed, comes on at a time when the patient should be beginning to feel

* If the pain comes earlier than two hours, there will usually be found either a commencing stenosis of the duodenum, or a mass of recent adhesions to the liver; if later than two hours, the ulcer is often seen to be tucked backwards, being adherent at the upper part of the right kidney pouch.

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hungry for his next meal; for this reason the term "hunger-pain," which I suggested in a former paper, seems quite appropriate. The interval of relief after a meal varies chiefly according to the character of the food taken. The more substantial the food, the greater the interval of relief. The appetite is generally good; in fact, often better than the normal if stenosis has not developed. It is not unusual for a patient to say, "I've a good appetite; I can take anything, and I never vomit." If he has given a history of pain, as I have described it, one may be confident that he has duodenal ulcer, without stenosis. Investigation by test meals will show no stasis and perhaps, but by no means always, some hyperacidity.

After a time—a few weeks, a month or two—the symptoms may gradually improve, and even disappear, to reassert themselves after a longer or shorter interval. The patient will then speak of having "attacks" of a certain duration, coming capriciously, leaving spontaneously. In the intervals between these attacks he may be perfectly well, suffer absolutely no discomfort, enjoy food, and gain weight. The attacks are more frequent and more severe in cold weather than in warm. A "chill" is often assigned as a cause of a certain attack, and attacks seem specially apt to come in times of stress and worry. The recognition of

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chronic duodenal ulcer is most necessary, for it is, I feel sure, a far more serious disease than gastric ulcer, and it is, moreover, one which, in my judgement, should always be treated by operation. I often see and operate upon cases of duodenal ulcer which have been variously diagnosed as "chronic gastritis," "acid dyspepsia," "hyperchlorhydria," etc. But a slender acquaintance with the pathology of the living is all that is needed to connect the clinical history outlined above with a condition of chronic ulceration in the duodenum.

Another, and I think incomparably the most important, result of the surgical work upon the stomach is concerned with the relationship between chronic ulcer of the stomach and cancer. It is a very remarkable coincidence that several surgeons of large experience have noticed that when the anamnesis of the cases of gastric cancer is studied, a clear history of chronic ulcer in the stomach is given by more than half the patients. A medical friend of mine to whom I mentioned this fact wanted to know the evidence which led me to the conclusion that an ulcer had been the cause of these early symptoms. My reply is, that if a patient now consulted me, giving the same history of his present sufferings as the cancer patient gives me of his sufferings of ten or twenty years ago, I would advise

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surgical treatment in the confident expectation of being able to demonstrate a chronic ulcer as their cause. And here let me incidentally say that as a cause of symptoms the ulcer which cannot be demonstrated does not exist, in my opinion. If an ulcer justifies operation it is an ulcer which can be seen and felt and displayed, to the conviction of the onlooker. Unless a definite ulcer can be seen during an operation there is, in my judgement, no indication for the performance of gastro-enterostomy. If this operation is done for the relief of symptoms dependent upon no demonstrable organic cause, the patient will have no relief, and the operation will be thereby discredited.

In cases of carcinoma the removal of the stomach has furnished a few specimens which demonstrate the undoubted connexion between ulcer and cancer. The evidence of the development of cancer in chronic ulcer is from the clinical side as clear as it can be in the majority of cases; the pathological evidence is, of course, more difficult to obtain, because it must almost necessarily be based upon investigations of specimens removed during life. For by the time cancer of the stomach has proved fatal, and the specimen is obtained on the post-mortem table, the ravages of the disease are so extensive that all evidences of its origin in an ulcer may be wholly obliterated. But evidence is

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fast accumulating which will finally and completely dispel any doubts which are still felt as to the direct influence of ulcer in the genesis of cancer. The arguments in favour of the surgical treatment of all chronic ulcers of the stomach and duodenum are already sufficiently strong. No other treatment than that which the surgeon offers can do more than relieve the patient to some extent of his sufferings when once a chronic ulcer is established in the stomach; for if the ulcer lying near the pylorus heal, its cicatrix, while steadily undergoing contraction, is causing a constant mechanical interference with the movement of the stomach. Relief from the misery which this entails is offered only by mechanical means, and no operation in surgery gives more satisfactory results than gastro-enterostomy in such circumstances. The mortality of this operation is very small; its results are extremely good. But the argument for surgical treatment becomes enormously strengthened when we are convinced of the fact that a large proportion, probably a majority, of the cases of cancer that develop in the stomach are due to the grafting upon the base of an old ulcer of a malignant process. Surgery, then, offers in cases of chronic ulcer not only a relief from present sufferings, but an immunity from the possible onset of a disease of a far more terrible character. I hope I may be

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allowed to insert here, perhaps a little irrelevantly, a plea for the earlier submission to the surgeon of cases of cancer of the stomach. It is simply lamentable to look through the records of the cases of cancer that have been referred to me or to other surgeons for treatment. In the very great majority the disease is too far advanced for anything but a palliative operation, and in no inconsiderable number is the patient so utterly exhausted by his disease that the mere thought of operation is repellent. If only the patients who suffer from cancer of the stomach could be seen at an early stage by the surgeon, there is no reason why the results of operative treatment should not be at least as good as they are in cases of mammary cancer.

It is, I submit, only by early exploration of possible cases of carcinoma of the stomach that the knowledge will be gained, by comparison of the symptoms with the pathological conditions then disclosed, which will equip us with the power of early positive recognition of this disease. At this moment the most expert clinician in the world cannot make an early diagnosis of cancer of the stomach. If, then, patients suffering from this disease are to have any hope of cure, it is undeniable that the diagnosis must be made by inspection of the parts during life. I think there can hardly be a more promising occasion for the study of the

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pathology of the living than that afforded in the case of carcinoma of the stomach.

DISEASES OF THE BILIARY PASSAGES.

The work of the surgeon in the diseases of the gall-bladder and bile-ducts has also been most fruitful in knowledge. In the early days of gall-bladder surgery but little was known as to the signs and symptoms which arose from the presence of stones in any part of the bile-tract. The symptoms which were taken to indicate the presence of stones were in fact symptoms called forth by the severe complications to which those stones gave rise. Jaundice, to mention but one symptom, was looked upon as a necessary manifestation before an unequivocal diagnosis of cholelithiasis was justified; yet jaundice is a very infrequent symptom of gall-stones, and is not present in by any means all the cases in which a stone is lying even in the common bile-duct. During the course of operations upon the stomach, appendix, intestines, or pelvic organs the gall-bladder can be examined, and at times stones are found therein of which there was no previous knowledge. By close inquiry after the patient has recovered certain symptoms are elicited which can then with confidence be attributed to the gall-bladder disease of which positive knowledge is now possessed. By such

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methods, varied in kind, we have acquired the knowledge which is indispensable to an early diagnosis of stone. Accordingly we know that the most frequent manifestation of cholelithiasis is "indigestion," pain after food, coming on usually an hour or so after a meal, great discomfort or cramp in the epigastrium, a feeling of insufferable distension relieved by belching, great flatulence. The pain is sometimes colicky in character. If these symptoms are severe and recurrent, elicited by certain articles of diet and not by others, a diagnosis of gall-stones may be safely made. Such a history is always obtained in those cases of advanced disease which are so frequently found on the operation table. In a case of choledochotomy operated upon on the day I write this paper the history given by the patient and by the medical man is that the first "attack" occurred two and a half years ago. In that attack the patient was jaundiced. When I elicited the anamnesis I asked directly, "How many years before this attack had you suffered from indigestion?" The reply came at once, "Oh, I have had *that* trouble for over thirty years." The history I drew from the patient of "that trouble" was the clearest evidence of the presence of stones in the gall-bladder; and at the operation the small, thickened, shrunken gall-bladder, full of stones and buried in adhesions, was clearly to be held re-

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sponsible for those faults for which a perfectly healthy stomach had so long been blamed. Jaundice, as I have said, is a very uncommon symptom in cholelithiasis. In my own cases jaundice at any period has been noticed in less than 25 per cent. Jaundice, which Courvoisier called the "cardinal symptom" of calculous obstruction of the common bile-duct, may now and again be wanting. A few months ago I removed a stone as large as a billiard chalk from the common-duct of a man who was not jaundiced and who never had been jaundiced, and I find that of 31 cases of choledochotomy performed by me during this year, in 7 jaundice was not present at the time of the operation. Yet in 6 of these cases the diagnosis of common-duct obstruction was confidently made, because of the rapid succession of attacks of pain, accompanied by shivering and sweating (a rigor, in fact), in a patient who was rapidly losing flesh.

It is a disgrace to our diagnostic acumen to admit it, but it is nevertheless the fact that the impaction of a stone in the common duct is not a rare event. When we have thoroughly learnt our work, we shall be able to recognise the presence of gall-stones before this serious and tardy complication of an otherwise simple disease has developed. In almost all common-duct operations the adhesions are very numerous, and the

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gall-bladder shows evidence of severe and long-standing disease—chronic cholecystitis, with thickening and sclerosis of the walls of the gall-bladder, to a degree which may make the organ difficult to discover, or even impossible to recognise; fistulæ may be present between the gall-bladder and the intestine, the common duct may be so dilated as readily to admit two or three fingers. When the duct is opened, it may contain many stones, pus, or offensive bile, and the hepatic ducts may be filled with stones or black tenacious mud. Stones which I have removed have been as large as a walnut, and in one case over 550 stones were numbered, and several thousands were left uncounted. Yet we are gravely told on high authority that a patient with a stone in the duct should not be submitted to operation because he is likely to recover if left alone. This opinion is based upon the fact that in forty years only one case of common-duct stone was found on the post-mortem table at Guy's Hospital. To deduce such an opinion from such a fact seems to me to be a shining example of a certain inaccuracy of thought which may come from a too exclusive devotion to the pathology of the dead. The most wholesome corrective for such an error is the close study of the pathology of the living. And unless an opinion is based in some meas-

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ure upon the knowledge so acquired, it must always be accepted with some abatement.

We are often told that gall-stones may exist for years in the gall-bladder without causing symptoms. I do not believe for one moment that this statement is accurate; it is only another of those legacies of error which were first bequeathed to us in the days when none but the dead could disclose the secrets of pathology, and which have since been handed down reverently from one generation to another. The truth is rather that those inaugural symptoms which are caused by the stones as they lie in the bladder are not generally recognised. Because jaundice has not been observed, the complaints of the patients are put down to "neuralgia of the stomach," or are complacently ascribed to some other equally vague "disease." Whenever gall-stones are discovered accidentally during the performance of an abdominal operation, such as hysterectomy, a history of symptoms attributable to them can in my experience always be obtained, though it is perhaps rare for an organic cause for them to have been previously recognised. So when a necropsy discloses gall-stones it is assumed, with no reason, that because jaundice or other positive symptoms are not recorded the stones have done nothing to excite recognition. I feel confident that it is not accurate to say

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the gall-stones frequently cause no symptoms; it is, on the contrary, quite certain that they frequently, if not constantly, cause symptoms which we are not educated to recognise. From the dead no account can be obtained of their previous sufferings, but from the patients who by accident disclose their stones to the eye of the surgeon much has been and far more may be learnt. From them we may glean much knowledge of the pathology of the living.

DISEASES OF THE PANCREAS.

It is as a result of the work of the surgeon upon the biliary apparatus that our knowledge of many of the diseases of the pancreas has been born. It was in 1896 that Riedel⁴ gave the first detailed description of chronic pancreatitis. He had noticed that in certain operations performed for cholelithiasis the head of the pancreas was considerably enlarged and was very indurated; its condition was, in fact, very similar to that found in cases of primary malignant disease. Riedel described in full 3 cases; in 2 the patients recovered after operation, and the pancreatic enlargement gradually disappeared; in the third case the patient died, and the microscopic examination of the gland showed that the tumour was due not to carcinoma, but to chronic interstitial inflammation. But until Mayo Robson's

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paper in 1900⁵ this subject did not attract general attention, nor was the clinical importance of chronic pancreatitis adequately recognised. It was therein demonstrated that many cases formerly regarded as examples of primary carcinoma of the gland were in fact cases of chronic inflammatory induration due to irritation and infection by gall-stones at some time present in the common duct. The discrimination of carcinoma from chronic pancreatitis became at once a matter of the highest importance, for it was clearly recognised that the inflammatory condition was amenable to surgical treatment, whereas cancer of the gland was, and still is, a hopelessly incurable disease. The differential diagnosis remained in all cases difficult, and in some impossible, until Cammidge discovered that the urine afforded important evidence in this connexion. The value of Cammidge's test in cases of pancreatic disease has caused much discussion, and I can only here record the fact that in many doubtful and difficult cases, both before and after operation, it has given me great help.

The fact that the common bile-duct is always in close proximity to the head of the pancreas and that in approximately two-thirds of all cases it actually runs within the substance of the gland, and that the mucous membranes of the common duct and of the

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pancreatic duct are continuous at the diverticulum of Vater, account for the frequency of the association of pancreatic disease with an infection of the common bile-duct due to stone. The inflammation of the pancreas will persist so long as the irritation and infection are continuously excited by a gall-stone; but—and herein lies a serious factor—when once the pancreatitis has progressed beyond a certain stage, it may persist even after the stone which first caused it has passed or has been removed. Gifford Nash⁶ and others have related cases in which glycosuria due to pancreatic disease has subsided as soon as the infection of the bile-passages was relieved by drainage. In a case of my own, however, a case seen with Dr. Stuart, of Settle, chronic pancreatitis due to stones in the common duct was found; the stones were removed, and the patient made a good recovery, and remained well for more than a year. Glycosuria then developed, and the patient died of diabetic coma. The sclerosis of the gland which followed upon the chronic inflammation had doubtless involved the islands of Langerhans. Chronic pancreatitis in its early forms no doubt passes often unrecognised; it is relieved by the treatment of the cholangitis which has caused it. In the later stages, however, when surgical intervention has been too long delayed, the condition is one which may prove of the utmost gravity.

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DISEASES OF THE LARGE INTESTINE.

There are several conditions involving the small intestine to which I should have wished to refer, but time and space forbid. I will ask your attention for one moment, however, to a remarkable result of a study of the living pathology in the large intestine. In a paper read last year before the Clinical Society of London⁷ I drew attention to certain simple conditions, some hitherto undescribed, in which the mimicry of malignant disease in the large bowel was complete. In operating for supposed carcinoma of the colon, resection of the growth is, if possible, performed. The examination of the specimen subsequently may reveal no evidence whatever of a malignant growth. A hyperplastic tuberculous tumour, a dense inflammatory deposit in the serous covering, or the formation of many false diverticula with inflammation in and around them, may be found. Such conditions are clinically not usually to be distinguished from malignant growths, and, but for their removal by the surgeon, might have waited long for recognition. Yet they are all innocent conditions, which, when removed, do not recur. Since the case of mimicry of carcinoma by the development of false diverticula, which is recorded in my paper, I have performed colectomy on a second case, and have

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seen a third in which a fistula had formed between the bowel and the bladder. Indeed, the formation of a vesico-intestinal fistula seems to be one of the tendencies of a perforated false diverticulum; a search through the literature has shown that it is far more common than was supposed. In cases where a hard growth in the intestine is accompanied by the passage of flatus and fæces by the urethra, a diagnosis of carcinoma seems irresistible, yet the probability is that "the growth" would be simple, and that the cause of the fistula would be a false diverticulum, which had burrowed its way through all the coats of the bowel, and thence through the wall of the bladder which had become adherent. These mimicries of malignant disease are found, of course, not seldom in the stomach, but their existence in the large intestine is not generally recognised.

TUBERCULOUS PERITONITIS.

A further illustration of the advantages of a study of the living pathology is afforded in respect of tuberculous peritonitis. Of the three varieties of this disease, the ascitic, the fibrous, and the suppurative, the former alone lends itself to successful surgical treatment. The first case in which surgical treatment was adopted was the historical one operated upon by

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Sir Spencer Wells in 1862. The patient was a female, aged twenty-two, who was believed to have an ovarian tumour. She had been twice tapped, on one occasion 18 pints having been drawn off; the fluid reaccumulated, and operation was advised. The abdomen was opened and myriads of tubercles were found studding the peritoneum. The fluid was emptied away and the abdomen closed. The patient recovered after a sharp attack of peritonitis.

After this it rapidly became the custom to operate upon many cases of tuberculous peritonitis with effusion. It was thought to be enough to open the peritoneal cavity, to empty it, and to close the abdominal wound without drainage. After such treatment the patient's recovery was much hastened, and the success of the operation was often very remarkable. A variety of explanations was offered as to the reason for the undoubted effect of so simple a measure. But a closer inquiry into the histories of patients treated in this way showed that the ultimate result was not fully satisfactory; in a certain number of cases the peritoneal affection recurred, and a second or even a third or a fourth operation had to be done. As a result chiefly of the work of J. B. Murphy and W. J. Mayo, we have been brought to realize that the simple emptying of the peritoneal cavity is not enough. They have shown

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that tuberculous peritonitis is always secondary to a local infection (which, however, may itself be secondary to disease elsewhere), and that the operation must include, if permanent success is to be ensured, the removal of this local source of infection. This source, which can usually, though not always, be demonstrated, may be the appendix, the pelvic organs in the female, or the intestine, and it is curious that in my last three cases an example of each of these primary infections was encountered. After the fluid is emptied away a search for the primary focus of disease is made; and this must be removed. The results of such treatment are much better than ever before.

I think it is evident that the opportunity for an early pathological examination in these cases of ascitic tuberculous disease is capable of revealing the origin of the infection in the appendix or the Fallopian tubes, whereas a later examination upon the post-mortem table could only show the universal havoc wrought by a disease that had been allowed to go on unchecked to a fatal termination. The pathology of the dead in such a case is little or no help to the treatment of the living. But by operating at an early stage the pathological processes are observed at a time when they are so limited in extent as to be removable.

In this very imperfect recital of a few of the results

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which have come from the work of the surgeon I hope I have said something to convince you that the study of morbid conditions within the abdomen during the progress of an operation has materially increased our capacity to make a more certain and an earlier diagnosis, and has accordingly equipped us with more efficient therapeutic power. It is, I submit, by a close study of the anamnesis followed by a careful investigation of the parts implicated in the disease *during the life of the patient* that the surest foundations for accurate diagnostic power can be built. The surgeon, after hearing the detailed story of an illness, has not to wait until death comes to the patient before he can lay bare those pathological processes which have given rise to all the symptoms. He can see and handle the organ or organs affected at the time they are exciting the sufferings of the patient; not at the time, months or years later, when all bounds have been overstepped by the unchecked extension of the disease, in parts laid waste by a late infection. At the time when symptoms are being caused, the pathological changes are open to examination; *that* is the advantage which comes from a study of the pathology of the living. So far as abdominal diseases are concerned, he is the best diagnostician who spends much of his time in the operation theatre. The lessons there to be

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learnt are far greater in number and far outweigh in value those that can be learnt in the post-mortem room, in so far as they bear any reference to the treatment of the living.

I would, therefore, urge upon all those engaged in practice the desirability of following their patients to the operation table whenever opportunity occurs. The lessons there to be learnt will in practice be of a value beyond all reckoning, and interest in the daily work will be thereby quickened to an unaccustomed degree.

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AN ADDRESS
ON
Inaugural Symptoms.*

DELIVERED BEFORE THE DERBY MEDICAL SOCIETY.

GENTLEMEN: In an address which I had the honour to deliver before the Ashton-under-Lyne Division of the British Medical Association a year ago, I ventured to call attention to what I termed the "Pathology of the Living," and I endeavoured to show in what manner our conception of various diseases, having their origin within the abdomen, had become modified by a study of the morbid conditions disclosed in the course of an operation. I pointed out that much of our knowledge of the pathological processes involving the abdominal organs was based, chiefly, if not solely, upon investigations made in the post-mortem room, and I ventured to assert that the evidence therein obtained was given a value greater than its worth, when it came to be reckoned as a factor influencing or deciding our views upon the question of therapeutic measures. At the

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time when the dead alone were available for purposes of accurate pathological diagnosis it was the symptoms which were manifested during the last few weeks or months of the patient's life which chiefly attracted attention. These symptoms were looked upon as the natural and necessary subjective expressions of those morbid conditions the final stages of which were presently displayed at the autopsy. And so when textbooks came to be written, it was the late symptoms and signs which, having attracted special and recent attention, became conspicuously recorded. It was the late manifestations which were thought to be the characteristic manifestations of any form of disease, and it was upon them that attention chiefly centered. But late symptoms are, I submit, no more characteristic of any disorder than early ones, and their importance as signals for therapeutic aid is relatively insignificant, for they come at a time when heroic measures have not seldom to be adopted if the life of the patient is to be saved or prolonged. Late symptoms are too often the heralds of death; inaugural symptoms may be the cry for timely surgical assistance.

In this paper I wish to draw attention to the urgent need which exists for a study of the very early symptoms of all diseases, but more especially of those affecting many of the abdominal organs. The surgeon, when

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he is about to operate upon a patient suffering from any abdominal disease, has the opportunity to observe not only those parts for which his operative interference is immediately necessary, but also all other viscera which can be laid bare through the same incision. If a morbid process in its earliest stage be then discovered, perhaps in parts other than those primarily concerned in the operation, the patient's story of his sufferings may be retold, and cross-examination conducted thereupon, as soon as recovery from the operation is complete. It rests, therefore, in no small degree, with the surgeon to elicit the inaugural symptoms associated with the pathological changes which he finds within the abdomen, and by making sure of their significance and of the due order of their appearance, to furnish the knowledge that will ensure clinical recognition of visceral diseases in their early stages, in the stages when they are surely amenable to curative treatment.

There is immediate need for this earnest investigation of inaugural symptoms. It is a frequent and depressing experience for the surgeon to have referred to him cases, of malignant disease more especially, though by no means exclusively, when the time for safe operative treatment, with the almost certain prospect of complete relief, has passed long ago. Only a few days ago, by the kindness of one of my colleagues,

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I became possessed of a specimen of chronic duodenal ulcer which had caused a patient's death. The man had been admitted to hospital suffering from profuse hæmatemesis and melæna; he was desperately ill, moribund indeed, and he died before the bleeding could be checked. An ulcer, the size of a shilling and about $\frac{1}{8}$ inch deep, eroded a large vessel the orifice of which was displayed in the base of the ulcer. That ulcer had existed for months, perhaps for years; it had long called aloud for recognition, yet its cry had never been heard or heeded, despite the fact that the symptoms of this disease are as definite and unmistakable as are those of a broken limb.

That cancer of the stomach is a common malady we know well enough; it claims an appalling number of victims every year. It is a disease which is purely local in its early stage, a disease which accordingly lends itself readily enough to radical treatment. Yet it is probably safe to say that there are not in all England ten patients who have been cured of this dire complaint. The tale of the victims of appendicitis is told almost daily in the newspapers. If the early symptoms of this disease were commonly understood and appropriate treatment adopted from the first (not necessarily operative treatment), the terrible mortality would be very considerably reduced. I think it is

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almost certain that the acute fulminating cases (so called) of this disease give always a definite warning of their approach; it is our ignorance of this warning that proves so disastrous. How does it come about, then, that we are so pitifully helpless in these and in many other like diseases? It is, I venture to say confidently, because we rely for our diagnosis not upon inaugural symptoms, but upon those of late appearance; we confuse far too frequently the symptoms of a tardy complication with those of the original morbid process itself. We hesitate to diagnose cancer of the stomach before a lump can be felt, and we have not the courage, in a case of reasonable doubt, to open the abdomen to look. We question the evidence of duodenal ulcer until hæmorrhage occurs, though hæmorrhage is a late, dangerous, and preventable manifestation. We dare not hint the presence of gall-stones till jaundice comes, though symptoms of the plainest meaning have been present for years and in spite of the fact that jaundice is an infrequent symptom of gall-stone disease. Indeed much of the text-book symptomatology urgently demands revision. It is based upon diagnoses made in the advanced or terminal stages and verified upon the dead. Our knowledge now of the "pathology of the living" must urge us to scrutinise the early history more closely and to endeavour to correlate the inau-

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gural disturbances of health with the morbid conditions responsible therefor, which are laid bare by operation.

I think there is a fault of which we are all in greater or less measure guilty—we are very apt to ignore or belittle the history of the case from the patient's point of view, the anamnesis, that is. The word "anamnesis" is one the significance and the usefulness of which seem to be insufficiently appreciated. It means the calling again to mind incidents in the past, the recollection of occurrences almost or entirely forgotten until thought was concentrated thereon. Its meaning in medicine accordingly should be the reproduction in the patient's mind of the details of the earliest clinical history. The "previous history" as it is generally told in published case reports is a jumble of the statements of the patient and of the prejudices, opinions, and reflections of the recorder. It is time that the word "anamnesis" came into general adoption, and that it should be held strictly to indicate the recollection by the patient of the details of his illness—that, neither more nor less. The anamnesis cannot be too detailed, for it affords the only authentic information which can be obtained, and when it is reviewed in the light of the fuller knowledge which has come to the surgeon after the exposure and careful, purposeful

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scrutiny of the parts involved we should little by little become confident in making our diagnoses at a much earlier period than now seems customary or possible. A plan which I frequently follow is to ask the patient to write for me in the most detailed manner the story of his own sufferings from the time of their very earliest onset, exaggerating nothing, omitting nothing because of its irrelevance or apparent triviality. Many little points may be brought out in this way, points which are apt to escape one's notice when the bedside examinations are being made.

It is in dealing with the acute catastrophes occurring within the abdomen that we shall probably derive the most instant and striking advantage from an attentive study of inaugural symptoms. It is in these cases that minutes gained mean lives saved; for the earlier the gravity of the case is realised and surgical treatment adopted, the safer will the issue be. Other things being equal, the mortality rises in direct proportion to the time which has passed since the disaster occurred. Many of the symptoms and signs formerly described as attendant upon the perforation of a hollow viscus are not manifestations of that particular incident at all, but are evidences of a later and preventable complication—acute diffuse peritonitis. To take a specific example, the perforation of a gastric or duodenal ulcer.

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But let me first say that a catastrophe of this kind is almost always capable of being forestalled. Though the onset of perforation in an ulcer is acute, the ulcer itself is of the chronic type. It is an ulcer that has existed for months or years, and it has given, in almost every instance, not only sustained evidence of its existence, but a recent warning that the pathological processes engaged in it were becoming more acute. The warning, however, is commonly ignored, because the significance and importance of it are not understood, and accordingly a disaster is precipitated. There are few catastrophes occurring within the abdomen that are veritably "acute." When we speak of such things we refer, as a rule, to the abrupt incursion of acute symptoms into the even and placid course of a disorder whose more tranquil manifestations have been present for months, or it may even be for years.

If the account of the perforation of an ulcer given in most of the text-books be examined, it will be found that collapse, rapidity and poor quality of the pulse, and distension of the abdomen are conspicuously mentioned as symptoms. Yet when a case is seen in the early hours, not one of these is necessarily present. Collapse is certainly not present, if it is to be measured by the customary signs, for there is usually a pulse

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that is not above 80, and of a quality that is not very perceptibly altered from the normal. But if there is intense pain, with the most unyielding stiffness of the abdominal muscles, then a perforation has probably occurred. When it is remembered that the diaphragm is also an abdominal muscle, and that it is held with a rigidity that never slackens, the shallow thoracic respiration is explained at once. The patient cannot make any pretence to breathe deeply, and the replies to one's questions are jerked out with an effort, the end of which is cut short by a spasm of pain. This unalterable resistance of the abdominal wall is doubtless a reflex having for its purpose the protection of the acutely affected area by a muscular splint. The alert, anxious, apprehensive look the patient always wears is the most eloquent evidence of his intense sufferings. These things, then—the sudden onset of an acute intolerable pain that does not abate, rigidity of all the abdominal muscles, light and shallow breathing, with an inspiratory phase that often ends abruptly in a “catch,” together with the intensely anxious expression which the face always wears—are ample warrant for a diagnosis of a perforation. A previous history of indigestion is rarely, if ever, lacking. A rapid pulse-rate, vomiting, abdominal distension, are not to be looked for among the inaugural symptoms. They are

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the proof that precious time has already been wasted and a valuable opportunity thrown away.

Of the symptoms of duodenal ulcer—a common disease, more frequent, indeed, in my recent and present experience than gastric ulcer—I have written fully elsewhere.² It is a very curious feature in connexion with this disease that perfectly accurate accounts of its symptomatology are given by authors who do not seem to have the remotest conception that the condition they are describing is not, as they suppose, one of “functional” disorder, but one in which a demonstrable organic lesion is present. The vague terms “hyperchlorhydria,” “acid dyspepsia,” “nervous dyspepsia,” are given very generally as diagnoses; they are too often words without meaning, clinical synonyms for the pathological condition duodenal ulcer. This is a disease which, left to itself or attacked in the most approved manner by diet or by drugs, is a very serious menace to health and frequently imperils the life of the patient. I have already referred to hæmorrhage in connexion with this disorder. Now, hæmorrhage is, almost without exception, a very late symptom of duodenal ulcer; it is an evidence that a diagnosis which should have been made earlier has been missed. Yet what do the text-books say? In Nothnagel’s “Encyclopædia” (page 245) we are told that “severe

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hæmorrhage occurs in about one-third of the cases," and Cullen, Fenwick, and Perry and Shaw are quoted, who variously estimate the death-rate from hæmorrhage as from 13 to 36 per cent. Surely it is almost as reasonable to wait for hæmorrhage before venturing to diagnose a duodenal ulcer as to include a ruptured perineum among the signs of pregnancy.

I am disposed to think that we shall be repaid sevenfold by a very close attention to the inaugural symptoms of gall-stone disease. At the present time no slightest notice is paid to them in the ordinary textbooks on medicine. Here I deliberately select one of them for quotation, because it lies always near my hand and because it is written by the ablest authority I know—one of the choice and master spirits of this age, who has always displayed a great interest in surgical work and an intimate knowledge of surgical literature. Therein it is written: "In a majority of cases gall-stones cause no symptoms. The gall-bladder will tolerate the presence of large numbers for an indefinite period of time"; and again: "It will be better, perhaps, to consider cholelithiasis under the following headings. The symptoms produced by the passage of a stone through the ducts—biliary colic; the effects of permanent plugging of the cystic duct; of the stone in the common duct, and the more remote effects due

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to ulceration, perforation, and the establishment of fistulæ." Then follows a detailed description of the symptoms of the disease in these various terminal stages. There is no mention, it will be seen, of any early symptoms, nor of the symptoms which are due to any other than late and, as I hold, preventable, complications. The very accurate descriptions which follow refer, all of them, to the stages of gall-stone disease which it should be our business to forestall by removal of the offending cause in the early days.

The only authority, so far as I am aware, who has directed special attention to the early symptoms caused by gall-stones is Kraus,³ who describes what he terms a "prodromal stage of cholelithiasis." He gives a clear account of the fairly early symptoms by which gall-stones announce their presence; his description is accurate, not for the period during which gall-stones are possibly forming, but for the period when they are already present and are bent on making their whereabouts known. It is of the greatest importance to recognise that the inaugural symptoms due to gall-stones are referred in the anamnesis, not to the liver or to the gall-bladder, but to the stomach. The patients complain of a fullness, weight, distension, or oppression in the epigastrium coming soon after meals, usually within half or three-quarters of an hour, re-

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lieved by belching, and dismissed almost on the instant by vomiting, elicited with remarkable constancy by certain articles of diet and dependent rather upon the quality than upon the quantity of the food. There is a sensation of great tightness, which, if unrelieved, may become acute pain, from which the patient obtains ease by bending the body forwards, by flexing the right thigh on the abdomen, or by loosening all garments which fit tightly to the waist. There is frequently great complaint of "acidity" or heartburn, and in the act of belching there may be sour or acid regurgitation. While the discomfort lasts the patient may notice a "catch" in his breath, and he finds, perhaps, that it is impossible to breathe deeply without feeling an acute stabbing pain at the right costal margin. There may be a feeling of faintness and nausea, and, rarely, vomiting may occur spontaneously. After a more than usually severe attack of "indigestion" the body and side may feel stiff for several days. A frequent and a very characteristic early symptom of cholelithiasis is the occurrence during an attack of indigestion of a slight sensation of chilliness, especially in the evenings, after a meal. The patient may shiver for several minutes, and may hasten from the table to huddle over a fire. The sensation of "goose flesh" is often experienced, and several medical men upon whom I have

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operated have said that in the severer phases it was not unlike a very slight rigor, the chilly stage being quickly followed by one in which the body feels hot, and the skin begins to act freely. My friend, Dr. Leonard Molloy, who is very quick to recognise the presence of gall-stones, groups all these symptoms in the phrase, "gall-bladder dyspepsia."

It is no doubt owing to the fact that these inaugural symptoms of cholelithiasis are not generally recognised that the pernicious and inveterate heresy, which asserts that calculi may commonly exist in the gall-bladder without causing trouble, is still abroad, and is still complacently accepted as an article of faith by every physician and by many surgeons. Naunyn writes (p. 56): "Cholelithiasis is, as post-mortem observations show, an extraordinarily common malady. On an average every tenth human being, and of elderly women perhaps every fourth, has gall-stones. This does not, of course, express the frequency with which biliary calculi give rise to morbid phenomena, for one often enough finds, post mortem, the gall-bladder and bile-ducts completely packed with calculi, although these have never caused any inconvenience or produced any ill effects. In such cases cholelithiasis may be a perfectly harmless condition, and not merely a latent one." It is to be admitted at once that gall-stones

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may exist without arousing those symptoms which Naunyn proceeds to describe in the most admirable manner, the symptoms which have a text-book authority—the late symptoms. But I have no hesitation in affirming that it is excessively rare for symptoms, which are plain enough in their meaning if only we had the intelligence to recognise them, to be absent when stones lie within the gall-bladder. Probably the only circumstance which in such cases prevents their appearance, or rather is responsible at last for their cessation, is the closure of the cystic duct. The gall-bladder is then no longer a reservoir for bile; it is out of the circuit, so to speak, and the stones which lie within it are inert foreign bodies of the same kind as the bullet which lies embedded and encapsuled in the muscles of the thigh. This condition is one to which that very able surgeon, Mr. Rutherford Morison, applied the term “natural cure.” A sort of cholecystectomy has been performed by nature’s rough hand in the tedious and dangerous attempt to give relief by isolating a cause of persistent irritation. Symptoms of the kind described then cease to appear, but the fact of their presence at an earlier period hardly fails to be elicited when purposeful inquiry is made. With the rarest exceptions, therefore, I believe it to be true that stones do not develop in the gall-bladder, and do

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not remain there after their formation without exciting symptoms of a kind which we have neglected adequately to study. In my own experience, which is not inconsiderable, I have never yet found gall-stones in the gall-bladder, when performing other abdominal operations, without being able subsequently to elicit the most positive evidence of their frequent endeavours to attract attention and to reveal their presence.

The most melancholy part of my own daily work is that concerned with the treatment of cases of carcinoma of the stomach. It is true that in some instances where I have performed partial gastrectomy, and in one where the whole stomach was removed, the results have been very gratifying. These cases show what may be done in the way of radical treatment for this frequent and horrible disease. Yet they leave one full of regret that they bear so very small a proportion to the total number of cases that are referred to us for advice or for treatment. Nothing to me is more depressing than to be compelled to confess in a case of cancer of the stomach that surgical treatment offers no prospect of any the slightest relief, even for a few weeks or months, to the patient's pitiful condition. Yet of cancer of the stomach it is perfectly accurate to say that it is often a disease which timely treatment could have prevented, and one with which surgery

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should be able successfully to grapple. The truth of the former of these statements depends upon the demonstration of the connexion between chronic ulcer of the stomach and carcinoma. The anamnesis of patients suffering from cancer of the stomach seems to indicate that in rather more than 60 per cent. of the cases a chronic ulcer has preceded the onset of malignant disease. The pathological evidence now available shows that cancer develops in connexion with an ulcer in something more than 50 per cent. We have waited long for the pathological proof of that which clinically we had long suspected; such proof can only be furnished by specimens examined in a stage where the transformation is not yet complete. The simple ulcer and the malignant degeneration must exist side by side, and the former must be of greater age than the latter. Specimens of this kind are hardly to be found on the post-mortem table, in the bodies of those who have fallen victims to the unchecked ravages of this disease; they must be obtained from the operation theatre. It is in the examination of specimens of partial gastrectomy that the convincing pathological evidence has now been found. Dr. W. J. Mayo, who in this matter is not exceeded in experience or authority by any living surgeon, found that, in 180 cases of resection of the stomach, cancer was demonstrated to

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have sprung up in the base of an ulcer in 97, that is, in 54 per cent.⁴ The surgical treatment of chronic gastric ulcer may, then, be confidently expected to diminish the number of cases of cancer of the stomach, if the latter is not seldom the tardy result of the former. The possibility of a radical cure of cancer of the stomach once developed depends upon our knowledge of its mode of spreading in the stomach itself, and of the distribution of the lymphatic vessels and glands of the parts involved. As a result of the researches of Cunéo and others, we are well equipped with information on these points. Cancer of the stomach, then, should not be the almost certainly fatal disease which it is at this moment. All that is necessary is the recognition of the cases in an early stage, and this can only be achieved by earnest research into the inaugural symptoms. Of cancer of the stomach I described⁵ two types as they affect the distal half of this organ, the "pyloric" and the "prepyloric." In the former the symptoms are obstructive from the beginning, and vomiting appears when the disease is in its earliest stage. Stasis then is present, and it is not long before some hypertrophy of the wall of the stomach occurs. These cases should admit of early recognition and of very successful treatment, for there is no other cure of a mechanical obstruction in the stomach than that which surgery

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offers. In the "prepyloric" form the inaugural symptoms are individually vague, but collectively enable a certain diagnosis to be made. A man beyond middle life finds by degrees that he takes less interest in his meals; his food loses its relish and presently becomes distasteful. Life in many of its aspects seems to lose its zest; neither work nor leisure is enjoyed, and depression, increasing anæmia, and loss of weight are soon observed. It is not for many weeks, or perhaps many months, that vomiting is noticed; it is then due to the gradual enlargement of a growth which, beginning on the lesser curvature of the stomach, spreads downwards, on one or both surfaces, until it attains such size that the pyloric antrum becomes narrowed, and obstruction results. In several of my cases hæmorrhage has been the first symptom. I had under my care recently a gentleman of sixty-seven, referred to me by Dr. Malim, of Rochdale, who suddenly, without any warning, when feeling in robust health, vomited a very large quantity of blood and fainted. Soon afterwards the symptoms I have just detailed made their appearance, and at the operation a growth of the prepyloric form was discovered. An exactly similar beginning occurred in a case kindly sent to me by Dr. Daly, of Hull, a few months ago, and I have notes of several other instances. The sudden occurrence of profuse hæmatemesis in a

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man previously in good health is to be looked upon as especially significant. We should have our suspicions keenly aroused if, in a patient at or beyond middle life, whose anamnesis tells of the existence at some earlier time of a chronic gastric ulcer, there develop distaste for food, loss of appetite, intolerance and positive refusal of solid food, uneasiness after meals, even the restricted ones taken unwillingly, loss of weight, persisting anæmia, the gushing of acid or bitter clear fluids from the stomach into the mouth, and vomiting or hæmatemesis. Then exploration should be urged, for in the present state of our knowledge of the early symptoms there is no other method by which an early carcinoma of the stomach can be discovered. No one deprecates more strongly than I the haphazard exploration of the abdomen for diagnostic purposes. I think the most sedulous care should be expended on the examination of the patient, and that every detail of the anamnesis should be scrutinised before the abdomen is opened, otherwise we may let slip great opportunities for clinical research. We cannot correlate the clinical discoveries on the one hand, and the disclosures of the operation on the other, if we are perfunctory or neglectful in our acquisition of the former. But it would be foolish not to accept the position that at this moment there is no

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means of making an assured diagnosis of cancer of the stomach in the curable stage by any other means than the inspection of the parts as to whose integrity there is reasonable doubt. It may not be wholly inopportune to suggest that the system which at present obtains in many hospitals of admitting and of retaining cases of cancer of the stomach under the care of a physician is wrong. There is no medical treatment of this condition. If the patient is to have any chance of substantial relief, or the slender prospect of cure, it can only be through means which the surgeon alone is competent to employ.

The treatment of cancer of the large intestine is also greatly handicapped by reason of a lack of adequate knowledge of inaugural signs and symptoms. During the last few years I have performed colectomy in a large number of cases, and with one exception operative intervention became necessary because of the onset of acute or chronic obstruction, or because a tumour had been discovered in the large intestine. The presence of a tumour so large as to be felt through the abdominal wall and the occurrence of an acute obstruction are both evidence of ancient disease; for the intestinal growth is usually slow in its rate of increase, though not invariably so, and an acute obstruction comes ordinarily only as a terminal manifestation in the course of

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chronic intestinal disorder. Now, it is of the most urgent importance that the very earliest disturbances of health due to cancer should be recognised, for cancer here, as elsewhere, is at first a local disease; and because local and while local is surely amenable to complete eradication. In the case of carcinoma of the colon there are many points which in this special instance should make for complete success when the neoplasm is removed. The growth is as a rule slow, the lymphatic supply of the colon as a whole is not very free, the lymphatic system in all parts lends itself to very thorough removal, and is not invaded very early in the course of the disease. Furthermore, by means of a procedure to which I recently drew attention,⁶ great lengths of the large bowel can be removed without risk of damage to the vascular supply, and with the certainty that end-to-end anastomosis can be obtained. An early operation, if conducted upon the proper lines, should therefore give very gratifying results. What, then, are the earliest evidences of the invasion of the colon by carcinoma? The first, I think, is the insidious onset of intestinal irregularity. The bowel acts with a certain caprice, there is now slight constipation, and now slight diarrhœa. These symptoms become, of course, considerably emphasised at a later stage, where there may be intestinal obstruction of three or four

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days' duration, alternating with a copious and teasing diarrhœa. But something much less than this occurs quite early in the disease, and at the same time there is commonly present a symptom which I hold to be of great significance. It is the occurrence of a spasm, slight and transient, in a part of the large intestine. The patient tells us that every now and then there is a feeling of "gripping" (or he may himself use the word "spasm") in a certain very limited area of the abdomen, and he points always to the same spot. This is clearly to be explained by the existence of a slight hypertrophy of the intestinal muscle as a result of the increased effort necessary to pass the contents of the gut through a segment in which stenosis is already beginning to appear. A patient upon whom I recently operated for a growth in the sigmoid flexure described this sensation to me in these words: "I feel as if a hand within my body tightened every few minutes, trying to grip my watch." At the same time borborygmi are heard, and their onset is found to synchronise with the sensation of spasmodic pain. There is no disease having its place within the abdomen that the patient himself can so accurately locate as carcinoma of the large bowel.

The occurrence of mucus or of occult blood in the stools is probably to be expected in the comparatively early stages also. I have recently received help in the

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diagnosis of cases of obstruction in the large intestine from the examination by the *x*-rays of patients to whom bismuth had been administered by the mouth. The presence of an impediment to the easy passage onward of the fæcal current may be graphically depicted by the accumulation of the shadow-throwing bismuth behind the point of constriction in the intestine. When, therefore, any or all of these several points are elicited in a patient of middle age or over, and when loss of weight, indifference to food, or positive repugnance to it, or the deliberate avoidance of the more substantial meats, are together observed, there is every probability that serious organic disease is present in the large intestine.

Of all the diseases affecting the abdominal organs, there is none that may appear in such varied form as appendicitis. A slight attack may pass often unrecognised, its nature being elucidated only when a similar onset leads on a later occasion to a more severe attack, and an operation for the evacuation of pus or for the removal of the appendix then becomes necessary. In all instances, however, pain is the inaugural symptom; if other symptoms appear first, the diagnosis must be looked upon with suspicion. Only recently I have verified once again this rule, upon which that most acute observer, Dr. J. B. Murphy, has so long insisted.

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A lady, aged fifty, whom I saw with Mr. Jalland, of York, woke on a certain Friday morning at 5 o'clock, in a rigor. She was shivering violently, and her temperature ran up to 103°. She had no pain then, or at any time during the day, but remained in bed, as she felt weak and ill. At almost the same hour on Saturday morning she had another rigor, and again another at 7 o'clock on Saturday evening, and while this rigor was in progress she had a sudden and very severe attack of pain in the abdomen, and a very sharp attack of diarrhœa followed. There was no vomiting, but a decided feeling of nausea. During Sunday the pain continued, being worse every hour or two, as "spasms" of it came, and the abdomen gradually distended. I saw her early on Monday. The abdomen was full, especially in its lower half, and the muscles were tightly held. The whole of the lower part of the abdomen was tender; there was tenderness on vaginal examination, and the uterus, as was previously known, was enlarged to the size of an orange by a fibroid. The temperature was 100°, the pulse 100. The bowels had acted well after an enema. Mr. Jalland was convinced that the condition was steadily getting worse, and the evidences of a spreading peritonitis were unmistakable. The most likely diagnosis seemed to me to be perforative peritonitis; but pain was not the inaugural symptom. In discussing the case before operation I made the remark to Mr. Jalland that the signs were those of an acute perforative appendicitis, but that the initial symptom, pain, invariable in appendicitis in my experience, was absent. I opened the abdomen and verified Mr. Jalland's original diagnosis—a remarkably astute one, I think. There was a perforation at the fundus of the uterus from which offensive pus was oozing. An abscess in the wall of the uterus had ruptured into the general peritoneal cavity, wherein we found a very large quantity of the most offensive pus. I performed hysterectomy and drained the abdomen. The patient has happily made an excellent recovery.

The significance of the inaugural symptom, the

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thrice-repeated rigor, was at once appreciated when the pathological condition was exposed, for the initial rigors were clearly due to an acute inflammatory process in the walls of the uterus, while the later perforation into the general peritoneum was announced by the sudden onset of the very severe abdominal pain.

Time permits me to refer only in the briefest manner to the pancreas. This is the most important gland in the human economy; of its diseases we know little, and of their inaugural symptoms nothing at all. Yet it is hardly possible that a gland whose external secretion is the most potent of all digestive juices, and whose internal secretion is deeply concerned with the regulation of the metabolic processes of the body, should be able to deviate widely from the normal without betraying some clear sign. Many of the disorders of the pancreas, as Riedel taught us long ago, are associated with cholelithiasis. Mayo Robson has recently put forward good reasons for supposing that "catarrhal jaundice" may be due to an inflammation of the pancreas, whose consequent enlargement causes pressure upon and obstruction within the duct, which it transmits to the duodenum. I think the better view may be that both gall-stones and pancreatitis are themselves the result of an infection of the bile as it descends from the liver. The scavenging properties of the bile have

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been demonstrated by Lartigau and others. This excretion bears away certain organisms brought to the liver in the portal stream, organisms which render it an infective agent, which dispose to the formation of stones, and which make possible the infliction of an injury to the pancreas. Of the significance and of the consequence of inflammation so set going we are only now beginning to realize the grave importance. In two cases in my own practice I have known of deaths from diabetes three years and six years after operation at which chronic pancreatitis was discovered. We now know, chiefly from the work of Opie, that in a certain form of pancreatitis, the interacinar, the islands of Langerhans are attacked, their internal secretion which controls carbohydrate metabolism is suppressed, and diabetes results. But we have very little knowledge of the frequency with which diabetes depends upon a lesion of the pancreas, nor do we know how often such a lesion can be traced to an attack of "catarrhal jaundice" passed through in the days of infancy or childhood. Happily the labours of Cammidge have now made it possible for us to recognise, by examination of the urine and fæces, whether a morbid condition of the pancreas is present in any given case. We know that in mumps the gland is not seldom attacked, its implication in typhoid fever, as I have shown,⁸ is

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capable of demonstration, and it seems not improbable that it is in some degree affected in many of the acute specific fevers. What relation, if any, such incidents bear to the later onset of diabetes we have no remotest idea; but the subject may well repay attentive inquiry. The inaugural disturbances in so important a gland as the pancreas may perhaps have consequences the vastness and the importance of which are hardly realised to-day.

These are some of the instances, not by any means all, perhaps not even the happiest, which might have been selected, in which a commencement has been made in the investigation of the inaugural symptoms of abdominal diseases. It has seemed to me desirable and appropriate to call attention to the necessity for a closer and more intimate study of all diseases in their earliest beginnings. We must shake off the incurious apathy which seems now to possess us in reference to all those early, no doubt often "trivial," disturbances of health which lead slowly or swiftly, none the less surely, to disorders of so grave a character that serious or formidable measures become necessary for their arrest. It is chiefly, I think, to the general practitioner that we must look for the most effective help in this research. It is he who sees the cases first, and it is he to whom the occasion and the opportunity come for

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the early diagnosis. I believe it to be true that our text-book descriptions of the clinical aspects of many diseases are based upon the manifestations which are present when that disease is in its full career or is hastening to the end. The terminal rather than the prodromal symptoms receive detailed description. This was, of course, inevitable in the days when the confirmation of the diagnosis could only be made at the time the dead body was examined. Now our opportunity is greater and our responsibility clearer. It is, I think, by a closer and more intimate examination of the anamnesis, followed by a precise investigation of the parts affected during the life of the patient, that our knowledge of the earlier phases of diseases will come. By this means we shall be able by degrees to remove the reproach that now justly attaches to much of our work in the surgery of the abdominal viscera—the reproach that we are so often “too late.”

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AN ADDRESS
ON
Gastro-enterostomy and After.*

ON September 27, 1881, Wölfler, then assistant to Billroth, in Vienna, was engaged in operating upon a patient suffering from carcinoma of the pyloric portion of the stomach. Resection, which it was the intention of the operator to perform, was found to be impossible, and the abdomen was about to be closed when Nicola-doni, who was acting as assistant, suggested that a new outlet from the stomach, to replace that which the disease had obstructed, might be made by attaching the jejunum to the stomach. There are few surgeons who can afford to neglect the whispered hint of a well-trained and familiar assistant, and Wölfler immediately acted upon the suggestion thus quietly made to him. In this way there was introduced to surgery an operation which has been the means of saving unnumbered lives, and of restoring to many thousands that enjoyment of perfect health which would otherwise have been

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forever denied them. In surgical work the perfect method is rarely, if ever, a matter of instant accomplishment, nor is it often the work of a single individual. The very great majority of the operations practised to-day are, so to speak, composite procedures made up of details suggested here by one authority, there by another.

In the constant endeavour to find the simple and the safe method of gastro-enterostomy mechanical aids, almost beyond computation in their infinite variety, have been exploited by one surgeon after another. Happily, we have at last arrived with confidence at the conclusion that nothing more is necessary to ensure the firm union of the intestine to the stomach than the simple continuous suture. But though these bobbins, buttons, elastic ligature, and strings of all kinds are relegated forever to the museum shelves, we owe it to their inventors, and, above all, to Dr. J. B. Murphy, to say that, without the knowledge and the confidence which these things generally have given us, the progress of intestinal surgery must have been long delayed.

In the original operation of Wölfler the jejunum was attached to the anterior surface of the stomach, and it was placed in such a manner that its proximal end lay to the right, its distal to the left. The jejunum,

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that is to say, was anti-peristaltic in relation to the stomach. Various disabilities, the chief of which was regurgitant vomiting, followed this operation, and in 1885 von Hacker attempted to overcome them by utilising the posterior surface of the stomach rather than the anterior for the anastomosis. The results at first were little, if at all, better, and it was not until the year 1900 that the real causes of the distressing complications of the operation began to be understood. In that year Petersen, in reporting the results of Czerny's clinic at Heidelberg, called attention to the need for the attachment of the jejunum to the stomach at a point as close to the flexure as possible. He gave good reasons for the adoption of the "no loop" method, and by degrees the opinion has become widespread, if not general, that the posterior no-loop operation gives results, both immediate and remote, which are decidedly more satisfactory than those attainable by any other method. In this operation, as I described it some years ago, the attachment of the jejunum to the stomach was made along a line which ran from above downwards and to the right, to end at the lowest point of the greater curvature. In my own hands this operation gave excellent results; but this experience was not repeated by all surgeons. Dr. W. J. Mayo, for example, found that in some instances, generally after a

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period of a few weeks or a few months, bilious vomiting became troublesome, and in certain cases necessitated a secondary operation. He considered that this symptom was due to a mechanical obstruction, a kinking of the jejunum either at the flexure or at the upper end of the attachment of the bowel to the stomach, due to a double displacement of the intestine from its normal position. The normal position he described thus:¹

The jejunum from its origin drops at once into the left abdominal fossa. Not only does it pass to the left, but it gravitates backwards into the left kidney pouch underneath the splenic flexure of the colon, so that at a point 4 inches from its origin it lies on a plane to the left and posterior.

Accordingly he suggested that the attachment of the jejunum to the stomach should be made in such manner as not to alter this "normal position." The opening in the stomach was therefore made to run from above downwards and to the left.

There can be no doubt that the position Dr. Mayo describes is that in which the jejunum is often (by no means always) found when the abdomen is opened upon the operation or post-mortem tables. And it is so found for a very good reason—that is the position into which it falls by gravity when the patient lies on the back. The duodenum ends and the jejunum begins

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on the left side of the front of the body of the second lumbar vertebra, and from here, in the recumbent position of a patient, the gut, if free to move, will naturally drop backwards into the kidney pouch. But a moment's consideration will make it clear that this can be no fixed position. The jejunum is pendent from the flexure and alters its position from time to time; it can swing from one side to the other with ease, and without obstruction occurring at the flexure. The little mesocolic ligament prevents it sagging too tightly down towards the pelvis. I think it probable that this slender ligament exists purely for the purpose of suspending the flexure in order to prevent a kink occurring in any of the various movements of the gut. If a patient be made to lie on the right side before the abdomen is opened the jejunum will be found to fall to the right. If a patient dies while lying on the right side, the jejunum will be found to pass almost horizontally to the right, as I have clearly demonstrated. There can be no "normal position," therefore, of the jejunum in the sense described. The jejunal origin is so constructed that an easy play of the gut in all directions is possible. The best position, therefore, for an anastomosis of the jejunum with the stomach to take is determined by the most frequent or easiest position taken naturally by the jejunum. This is, in my opin-

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ion, the vertical position; and for some time now I have attached the bowel as nearly as possible in the exact median vertical plane, and have made the anastomosis as close to the flexure as possible. In a paper elsewhere I have discussed the causes of the "bilious vomiting" which occurs after the "no-loop" operation; here I need only say that it is probably due to a mechanical obstruction, slight indeed and perhaps intermittent, caused by a partial rotation of the gut around its longitudinal axis at the time the attachment to the stomach is made. It is therefore necessary to see that the part of the jejunum selected for the suture lines can be approximated easily, and without a twist or kink, to the posterior surface of the stomach at the place where the attachment is to be made. This, then, is the method of gastro-enterostomy which I believe to be the best; it is that which I have practised for almost four years in all cases, except in some few instances, about twenty or thirty in all, in which I have performed the anastomosis along Mayo's line. The immediate mortality of the operation has varied according to the type of case for which it is done. If cases of perforation and acute hæmorrhage are excluded the mortality is less than 1 per cent. In cases of chronic duodenal ulcer it has been in my hands a little over 2 per cent. I have had no deaths among the

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cases of chronic gastric ulcer. When the very enfeebled condition of many of the patients is remembered, I think it will be conceded that a smaller mortality than this is hardly to be expected in an operation of this character. The immediate results of gastro-enterostomy thus performed are, then, quite satisfactory. What are the ultimate results? Before endeavouring to give a satisfactory reply to this most important question I would ask you first to consider what manner of operation gastro-enterostomy is, and what is the precise purpose we should expect it to fulfil. I am an ardent and a sanguine advocate of this operation, than which I think there is none in all surgery more completely satisfactory; but I must confess to a feeling of amazement, when I see the operation advocated, as it not seldom is, for conditions for which hardly anything could be more inappropriate.

Gastro-enterostomy is, of course, a "short-circuiting operation," so called. It affords an opportunity to the stomach contents to avoid the long passage by the pylorus and duodenum into the jejunum. Do the contents avail themselves of this chance? This question raises the further question as to the effect of short-circuiting operations in general in the alimentary canal. Supposing antero-anastomosis to be performed, does

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the opening encourage all or any of the contents to pass by the new route, or is the old route more easily followed? This question has been answered both by clinical and by experimental work. For example, in a case of acute general peritonitis due to gangrenous appendicitis upon which I operated twelve months ago, a fæcal fistula followed and refused to heal. I therefore decided to operate, and, making an incision over the sigmoid flexure, I anastomosed the lowest piece of small intestine available above the fistulous opening to the sigmoid, the new opening being about 3 inches in length. After the operation the fæcal fistula discharged for several weeks, exactly as it had done before, and continued to do so until I obliterated the part distal to the anastomosis by suture. This case exemplifies what I believe to be a fact—that artificial openings are not preferred to the natural channels, unless in the course of the latter some obstruction is present. A great deal of valuable experimental work has been done by several observers, the first of whom was Kelling.² In a long series of investigations he performed gastro-enterostomy by all methods—anterior, posterior, Roux's; attaching the jejunum at a high point, at a low, and the ileum at any part. The results were always the same. Nothing passed by the new anastomosis; all food, solid or liquid, went through the py-

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lorus. Cannon and Blake³ demonstrated the same facts. When the jejunum was joined to the stomach, the new opening was not made use of, except in one case where it lay very close to the pylorus, and then only in a small measure. Delbet⁴ divided the intestines and attached the distal end to the stomach and the upper to the skin, so that all food passing by the gastro-enterostomy opening would be discharged by the rectum, all leaving by the pylorus would escape at the artificial anus. Nothing ever passed through the anastomosis; everything ingested, fluid or solid, left by the pylorus, and was discharged on the surface of the abdomen.

Tuffier⁵ showed the truth of these observations in similar experiments, when the working of the parts was demonstrated by feeding the animals with food containing bismuth. In all cases and in the hands of all observers the same fact was disclosed: with an unobstructed pylorus nothing is ever transmitted through a gastro-enterostomy opening. Why is this? The explanation given by Cannon and Blake is probably correct; it is that the new orifice becomes stretched in the movements of the stomach, and so becomes, as it were, a part of the gastric wall, not the slightest aperture remaining.

Much of the literature dealing with the surgery of

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the stomach has been hitherto concerned with the details of technique, with the complications which follow immediately upon the operation, and with the mortality. Upon all these points there is now very little left to say, except with regard to a very formidable sequel, destined, I believe, to prove the most serious of all—namely, peptic ulcer of the jejunum. Almost nothing has been written as to the after-results of the operation, and, so far as my knowledge goes, there has been no close examination into the history of patients at some long period after operation, nor any considered opinion passed upon the information so discovered. Of the immediate success of gastro-enterostomy and of its small death-rate many surgeons can now speak with the authority of adequate experience. But there is great need for a close scrutiny of late results, in order that we may learn what disabilities may attach to the operation, what are the limits to be put to its performance, what exactly are its sustained effects upon the general nutrition, and, finally, whether there is a possibility of any recurrence in the stomach or in the duodenum of whatever disorders first made the operation imperative.

In order to be able to speak with some authority upon these points, I have collected the records of all cases operated upon by me up to the end of the year

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1905. Owing to the kindness and courtesy of the many medical men who referred the patients to me in the first instance, I have been enabled to obtain written answers to a series of printed questions as to the present condition (February, 1908) of most of them. The reports in the great majority of cases have been made by the medical men, but a few have been received direct from the patients themselves. In order to eliminate all prejudice these reports were then handed over to my colleague, Mr. H. Collinson, who very kindly undertook the heavy task of summary, analysis, and criticism. For convenience and to ensure greater accuracy the cases were divided into four groups, in accordance with the plan always followed by me:

	NUMBER OF CASES	NUMBER OF DEATHS
(1) Perforating ulcer.....	9	1
(2) Cases of acute hæmorrhage.....	26	3
(3) Cases of chronic ulcer.....	205	2
(4) Cases of hour-glass stomach.....	15	3
Total.....	255	9

In all, there were accordingly 255 cases with 9 deaths, a mortality of 3.5 per cent. But in order to assess the actual risk which a patient undergoes it is more accurate to compute the death-rate in each separate class; for in cases where the operation was done because death was imminent from hæmorrhage

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the risk must obviously be greater, and in the cases of hour-glass stomach gastro-enterostomy may be only one-half the operation necessary; in no less than 6 of the 15 cases in my series has gastro-gastrostomy or gastroplasty to be performed at the same time. These complications add perhaps a greater increment of risk than does strangulation to the ordinary operation of radical cure of a hernia. In my series of cases, from the first I performed up to March, 1906, including every case and all complications, the mortality is under 2 per cent. But mere recovery from an operation is by no means all that is necessary. There is an unfortunate habit of describing an operation as "successful" almost at the moment of its completion. We are all accustomed to be asked by the relatives of patients who are interviewed when an operation is immediately over, whether the operation has been "successful." That is a question which may be answered satisfactorily only after the lapse of many months. In an operation of the severity of gastro-enterostomy—an operation, moreover, by which certain physiological principles seem to be set at naught—the lapse of two years is certainly not too much to allow us to speak with confidence as to its success. I propose to consider the after-results of my cases in the following manner:

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GROUP 1.—PERFORATION OF THE STOMACH OR DUODENUM.

During the period mentioned, that is, to the end of 1905, I operated upon 27 cases of perforating ulcer; 18 patients recovered. In 6 cases gastro-enterostomy was performed immediately after the closing of the ulcer, because of the narrowing at or near the outlet of the stomach which this procedure had caused. In two other patients symptoms due to cicatricial stenosis near the pylorus developed within a few months, and gastro-enterostomy was necessary to afford relief. In one patient I have recently had to operate four years after the closure of a perforating ulcer, which had caused a contraction in the centre of the stomach. Gastro-enterostomy was performed to the greatly hypertrophied cardiac pouch of an hour-glass stomach. In 9 cases, therefore, in a total of 18 who recovered, the operation of gastro-enterostomy has been necessary. All these cases are reported to be now quite well. Of the remaining 9 cases, 8 are quite well and are free from stomach symptoms, one suffers from slight indigestion and occasional vomiting; the ulcer in this case was prepyloric. The freedom from suffering of those patients in whom the ulcer was on the lesser curvature and away from the pylorus is significant in connexion

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with the question as to the need for gastro-enterostomy in cases of chronic ulcer so placed. Infolding or the excision of such an ulcer, it is clear, suffices to effect a cure.

GROUP 2.—ACUTE HÆMORRHAGE.

In the series of hæmorrhage cases there are 23 patients who recovered from the operation. All are alive now, and reports as to the present state of health have been received from 22. One patient, who was admitted to the hospital from prison, cannot now be traced; 18 are reported as being "perfectly well," "cured," "absolutely cured"; in each one a complete restoration to health, good digestion, and normal appetite has occurred. One case is improved in health, but is rather delicate. His medical man reports "the operation was for urgent and grave hæmatemesis, and undoubtedly saved the patient's life, but he is still as he was before—weak and frail. There are no symptoms of dyspepsia." Three patients have suffered from post-operative vomiting. Two of the cases, operated upon in January and March, 1903, had the posterior long-loop operation; in one vomiting of bile occurred infrequently for a year and then disappeared. The patient is now "quite well." In another it has continued at intervals of two up to three weeks up to the

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present time; the patient, moreover, says that she is "far better" than before, and "able to work now." In the third case the no-loop operation was performed, the jejunal direction being downwards and to the right. This case is to me the most interesting of all, for it is the only case in which after the no-loop operation any bilious vomiting has occurred. The operation was in February, 1905, upon a patient seen with Dr. Nicholson Dobie and the late Dr. Dreschfeld. Bilious vomiting occurred every week or two up to three months ago, when it disappeared after repeated lavage. In this case, after the anastomosis was completed, it was noticed that the jejunum did not fit well; it seemed to be twisted above the point of union with the stomach: a remark to this effect is made in the notes written on the day of operation. In over 200 cases of the posterior no-loop operation in which the jejunum was applied to the stomach vertically or with a slight inclination to the right, this is the only one in which bilious vomiting has occurred, and it is of great interest to note the fact that the appearance of the parts at the completion of the operation did not seem to me to be as satisfactory as usual.

GROUP 3.—CHRONIC GASTRIC OR DUODENAL ULCER.

There were 205 patients, upon whom 214 operations were performed.

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The following table shows the cases classified:

	CASES	DEATHS
(a) Gastric ulcer, duodenal ulcer—singly or together	174	2
(b) Cholelithiasis with ulcer.....	4	0
(c) Cholelithiasis causing obstruction.....	6	0
(d) Cases in which no ulcer was found.....	11	0
(e) Pyloroplasty (secondary gastro-enterostomy)..	3	0
(f) Secondary operations, the primary being performed elsewhere.....	7	0
(g) Secondary operations in cases classed under (a) and (f).....	9	0
	214	2

Late Results.

In 14 cases no report was furnished in 1908, but in 11 of these the patients were seen by me or reports were received over two years after operation, and I have notes to say that all were well; in 3 cases no report can be obtained.

In 12 cases the patients were reported to be “no better” or “about the same.” In 6 of these cases, all women, no ulcer was found at the operation, nor any evidence of obstruction.* One of the cases was a secondary operation by myself, the primary operation having been performed elsewhere. I found no lesion of the stomach, and closed the abdomen without doing

* It is now clear to me that these were cases of “appendix dyspepsia”; a class of cases now easily to be recognised. The medical “gastric ulcer” is frequently an appendix.

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anything further. There has been no relief from the symptoms, pain, and hæmatemesis. In another case the lesion was very slight, a small scar only being found on the posterior surface. One case is an example of Finney's operation. Three suffer from regurgitant vomiting, but are kept fairly comfortable and free from symptoms by lavage.

A close study of the unsatisfactory cases has seemed to me to be especially necessary, in order to discover the circumstances in which the operation of gastro-enterostomy does not give satisfactory results. All the patients had suffered much from "indigestion," pain of sufficient severity to make them consider hopefully the question of operation, and from vomiting, hæmatemesis in 2 cases, and loss of weight. Nine of the patients were women. Of the 3 cases in men, 2 were relieved entirely of their original symptoms, but suffer from regurgitant vomiting; both operations were performed in 1903, and a long jejunal loop was left; the third was a case of Finney's operation. Among the 9 women there were 6 in whom no ulcer could be demonstrated; and there was neither stasis nor evident obstruction in any of them. Three of the patients are pronounced to be "intensely neurotic," and the operation has "not made much difference." It is satisfactory to be able to report that only one case in

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this series was operated upon later than January, 1904. The lessons to be learnt from this series are: That the mimicry of the symptoms of ulcer in women may be very exact; that in the absence of a demonstrable lesion, or some evidence of stenosis, gastro-enterostomy must not be performed; that the long jejunal loop is the cause of regurgitant vomiting; and that relief to symptoms may be completely given by an operation which is mechanically imperfect, and which therefore entails that distressing sequel, bilious vomiting.

In 5 cases there has been complete relief from the symptoms for which the operation was done, but in all there is slight, very occasional vomiting of bile. The intervals of this vary from "two to three weeks" to "every few months." In all, the patients have returned to work, eat well, have gained weight, and attribute the onset of the vomiting to slight or grave indiscretions in the matter of diet. In 4 of the cases the patients are "well satisfied" with the result of the operation, though their surgeon does not share their feeling of content.

In 10 cases the improvement is doubtful or has been tardy; 3 of these were secondary operations, the original operation being done elsewhere. In one case of duodenal ulcer with the most intense hyperchlorhydria there was a recurrence of symptoms one year later, and

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at a second operation elsewhere some adhesions and a jejunal ulcer (?) were found. The patient recovered and improved subsequently. One patient, after improving considerably, began to suffer, subsequent to pregnancy, from severe dragging pain in the abdomen. Ventrifixation of the uterus was performed, and she is now well and at work. The remaining patients have still some of their former symptoms, and usually have to make occasional calls upon their medical men. The chief symptom that remains is vomiting. In all, the ulcer found was small, and at some distance from the pylorus, in the body or on the lesser curvature of the stomach.

Eight patients have died since the operation: one, six and a half years later of carcinoma of the pancreas; one, six years later after operation by another surgeon for carcinoma of the cæcum; one, eight months later of acute pneumonia; one, four years later of cardiac disease; one, three months later of acute abscess of lung; one, one year later of cardiac disease; one, two years later of pernicious anæmia; in one case the cause of death three years later is not mentioned.

In 7 cases death occurred from malignant disease of the stomach developing at the site of the ulcer. The deaths occurred two years, four years, two and a half years, three and a quarter years, one year, one and

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a half years and two and a half years subsequently. The deaths in these cases are very significant. The interval in most of them between operation and death suggests that the condition present at the time of the operation was not then malignant, but rather that a carcinomatous invasion of the diseased part occurred at a later period. They were, perhaps, examples of *ulcus carcinomatosum*. There can be no doubt that in some of these cases Rodman's operation—excision of the ulcer-bearing area—would have been the better procedure.

Two patients died as a direct result of the operation: one from uræmia, one from acute obstruction due to hernia of all the small intestines into the lesser sac, and strangulation at the margin of the opening through the transverse mesocolon.

The final results in this group may be briefly stated thus:

Living:

Cured.....	148
Relieved.....	5
Doubtful.....	9
No better.....	12
No recent report (11 of these may be considered certainly as cured).....	14

Dead:

As result of operation.....	2
Of carcinoma of stomach.....	7
Of other causes.....	8

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GROUP 4.—HOUR-GLASS STOMACH.

In 15 cases gastro-enterostomy was performed, being combined in 6 with other operations—gastroplasty or gastro-gastrostomy. There were 3 deaths. In one patient regurgitant vomiting occurred so severely as to need the secondary performance of entero-anastomosis. All the 12 patients are now perfectly well, and in the enjoyment of good appetite and sound digestion. They are all cured of their stomach disorders.

Such is the detailed analysis of the cases included in each separate group. In order that an accurate general statement as to the effects of gastro-enterostomy may be made the cases must be brought together.

A summary of the cases gives the following results:

Group 1.....	8 patients living;	8 patients cured
Group 2.....	23 patients living;	19 patients cured
Group 3.....	188 patients living;	159 patients cured
Group 4.....	12 patients living;	12 patients cured
	<hr/> 231	<hr/> 198

The present condition of all the patients is as follows:

Patients cured.....	198
Improved.....	8
No better.....	12
Doubtful.....	9
Not recently reported.....	4
	<hr/> 231

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Twenty-four patients are dead—9 as a result of the operation, 7 of carcinoma of the stomach, 8 from other causes unconnected with the disease of the stomach or the operation performed for its relief.

CONCLUSIONS.

Such is a brief abstract of the analysis of all the cases upon which I operated from the beginning of my experience to the end of the year 1905. The result of the enquiry into the after-history enables certain conclusions to be drawn which may guide us in our treatment of the chronic disorders of the stomach in the future. I would submit to you the following propositions:

1. Gastro-enterostomy is a short-circuiting operation, and, like all such procedures, acts best when a gross mechanical obstruction exists in the normal path of the intestinal contents.

2. Experimental work shows that when the pylorus is normal, and there is no impediment to the passage of food through it, the opening made in the operation of gastro-enterostomy does not allow of the escape of any of the gastric contents into the intestine.

3. The operation, therefore, gives the best results in cases where there is organic disease in the prepyloric or pyloric region of the stomach or duodenum, or when

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performed on the cardiac side of a stenosis in the body of the stomach.

4. When an ulcer is found on the lesser curvature towards the cardia, it should be excised if possible; gastro-enterostomy is not necessary, and if performed is either almost useless or entirely harmful.

5. When there is a suspicion of malignancy in an ulcer or ulcers in the pyloric region, Rodman's operation should be performed.

6. Under no circumstances, and in compliance with no persuasion however insistent, is gastro-enterostomy to be done in the absence of demonstrable organic disease.

7. Regurgitant vomiting, formerly the most troublesome of all complications, is dependent upon faults in the operation which result in some mechanical obstruction to the intestine. These faults are chiefly dependent upon the presence of a "loop" in the jejunum, but may also be caused by a twist in the intestine around its longitudinal axis at the time of its application to the stomach.

8. The posterior no-loop operation, with the vertical application of the bowel to the stomach, is the best procedure.

GASTRO-ENTEROSTOMY AND AFTER.

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The Early Diagnosis and Treatment of Cancer of the Stomach.*

A DEBATE upon the early diagnosis and the treatment of cancer of the stomach is most necessary, for the disease claims approximately 1500 victims every year in England; it is seldom that we are enabled to do much to relieve those who suffer from it, and the cases that we have cured are so few as to be almost negligible. It is only by the close association of the physician and the surgeon, and by their united endeavours, that any hope of improvement in this lamentable state of affairs can be entertained. The opinions which I am about to express will probably not meet with the approval of all, may perhaps encounter the strong opposition of some, but they are views which I have been brought by degrees to hold firmly, and I am here to speak of the faith that is in me.

ANAMNESIS.

It has long been a practice of mine, in eliciting the anamnesis of patients referred to me with any abdomi-

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nal disorder, to endeavour to disentangle their thoughts from the present phase of the disease, in order to concentrate them upon the very earliest departures from health of which they have knowledge. A little persuasion, a little patience, and constant encouragement are sometimes necessary before the whole story will be told, but the time is well spent, and the inaugural symptoms, which are of the highest significance, are then disclosed. If this course be followed with patients who are subsequently shown, by operation, or autopsy, or by the later developments of their disease, to be suffering from carcinoma of the stomach, all three different types of clinical history will be elicited.

In the first the patient stoutly denies, nor can any persuasion induce him to recall, any earlier illness or suffering in connexion with the stomach. He will say that his digestion has always been of the best, and that all foods have been alike to him, all have been taken with zest, and that "dyspepsia" or "indigestion" has never in the slightest degree troubled him. In this condition of good, even robust, health there has been a forcible and abrupt intrusion of symptoms hitherto unknown. A sudden hæmorrhage from the stomach may occur, one or two pints of blood being brought up, and from that moment there appear the symptoms in-

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dicative of a gross lesion of the stomach. The anæmia which follows so free a hæmorrhage persists unduly, and food, especially meats, fat or lean, becomes distasteful. A sense of uneasiness, distress, weakness (it is variously described) is felt in the epigastrium; vomiting may be repeated, weight is lost, and a palpable tumour rapidly develops in the stomach wall. As a characteristic example of this class I will quote the following cases:

Mr. F., aged thirty-four. Sent by Dr. Mitchell, Oldham. Up to nine weeks before I saw him, on October 26, 1908, the patient had been perfectly well. The closest examination failed to reveal any history of former trouble in the stomach. His father-in-law told me that he was "the heartiest man in Oldham." Nine weeks before he had begun to suffer discomfort one hour after food; there was a feeling of fullness and flatulence in the epigastrium and abundant eructation of gas, which at last was almost rancid in its offensiveness. There was never severe pain, only a sense of "weight and stagnation." The patient repeatedly said he felt as if there were "something in the stomach that would not move on"; and he felt that the food could not get away. Four weeks later he began to vomit, and did so every day for more than a week; then occasionally there was a day when he did not vomit, and when that was so he afterwards noticed food which had been taken the previous day in the vomited material. Vomiting had ceased for over a week before I saw him. There had never been hæmatemesis nor melæna. From the beginning, but especially during the last month, he had got weaker and thinner and very much paler. When I saw him he was profoundly anæmic; his face was of a white, waxen appearance, and the mucous surfaces were almost bloodless. In the epigastrium I found a tumour whose upper

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margin was well defined, but whose lower was indefinite. The tumour moved on respiration; there was no dilatation of the stomach. The contents showed no free HCl; lactic acid was present. Oppler-Boas bacilli were innumerable. I found on opening the abdomen there was a growth along the whole length of the lesser curvature, and that throughout the stomach there were deposits of growth resembling boiled sago grains. Glands in all directions were enlarged, and there was a very large secondary growth in the liver. He died on December 23, 1908. The growth in the liver had increased considerably.

Mr. J., aged sixty-three. Sent by Dr. Malim, Rochdale. Up to August, 1907, he was perfectly well. He was a man who had led a busy life, amassed a fair fortune, and had lived carefully. There had never been any indigestion nor any abdominal disorder of any kind. There was, in fact, as the patient said, "a clean bill of health." In August, 1907, he had a severe attack of hæmatemesis; he did not remember ever having vomited before, and he had never vomited since. After this he was weak and ill and very anæmic, but he gradually improved in appearance and returned to business. He had, however, lost all appetite; he could not take any meat, and soon gave up all solids. Weight was lost rapidly. I saw him on March 14, 1908. He had the frame of a big man, but his clothes hung loosely upon him. He was very anæmic, and capillary vessels stood out prominently against the white background of his cheeks. He took very small quantities of soups and milk and tea. In the epigastrium a large, ill-defined tumour could be felt. Lavage and examination by test-meal showed long stagnation of all the contents of the stomach, which contained blood, yeast, pus, and bacteria. At the operation I found a growth involving the lesser curvature near the pylorus, and, passing behind the stomach, adhering to the pancreas, it involved the greater curvature also. There were several sago-like bodies on the surface of the pyloric portion of the stomach. I performed anterior gastro-enterostomy, with slight temporary benefit.

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In the second class are placed all those cases in which a clear history of chronic gastric ulcer can be obtained. In some of these cases there has been only one attack, or possibly two or three attacks rapidly succeeding one another within the period of a single illness, followed by a complete abeyance, or at least a complete latency of all symptoms until the onset of the malignant disease. In other cases the patients have had a long series of attacks, in many respects closely similar to the present one, of "indigestion." These attacks have been characterised by pain, appearing always at a definite interval after food, the interval being longer or shorter according to the character of the food taken. After a solid meal the pain appears rather more slowly, but is unmistakably more severe; after a meal consisting of fluids only the pain comes more quickly, is less severe, and passes away more rapidly. The pain varies in its position, but is usually referred to the middle line, where a tender spot can generally be discovered. The left or the right costal margin may be tender, and the radiations of the pain may be to one side or another, or through to the back. Vomiting is not a frequent symptom; when it occurs, it brings instant relief, and a habit of inducing it may accordingly be developed by the patient, who is confident of obtaining ease in that way. Attacks are prone to come more often in

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cold weather, or as a result of a chill, or by reason of increased work, worry, and anxiety. In some cases the evidences of stasis may develop, though they rarely become dominant. The patient, long accustomed to suffering, may be resigned to the restricted diet of a "chronic dyspeptic." One patient—a lady who celebrated her silver wedding a few days after I had operated upon her—had never, within the period of her husband's knowledge of her, eaten one solid meal. The foods usually taken are of the light, easily masticated, and easily propelled foods. In the history of many patients, however, there are "latent periods" during which food can be taken, if not with a keen relish, at least with better appetite and enjoyment than is usual. But after such a period there is again the breakdown, and pain in its characteristic form returns. An occasional indiscretion, even when the patient is quite well, may bring a reminder of the need for care, and certain articles of diet must be sedulously avoided at all times. Experience of repeated troubles has imposed upon the patient the necessity for care in the selection of a dietary. The "attacks" are without question due to a chronic gastric ulcer. When we operate to-day upon patients who recount these symptoms, the chronic ulcer can always be found and demonstrated. After a history of repeated attacks,

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alike in onset, in character, duration, and relief, comes one attack at first so closely resembling all the others that it is with difficulty to be distinguished as having a special significance, but by degrees revealing a sinister importance and leading on by stages, presently to be described, to a condition clearly due to cancer. This group is indubitably the most common. Approximately, two out of every three cases in which carcinoma of the stomach is found in my series give a history of this kind. One or two examples may be given:

Mr. M., aged forty-eight, sent by Dr. Wesley Smith, seen by me August 8, 1908. The patient has been "bothered with indigestion for years." The pain has always been definitely related to the taking of food. His meals have often been hasty; he has "bolted" solid food, and the meal times have been most irregular. After special stress of work, he has often had to "give up entirely" because of an attack of indigestion. Pain has come usually one and one-half hours after food, and the food has then begun to regurgitate; and a feeling of great oppression and fullness has been relieved by belching. About an hour after food he had "miserable discomfort," which a hot drink would often relieve. The present attack began about Christmas, 1907, and has continued ever since. He has lost over 4 st. in weight. Recently his discomfort has only been relieved by getting the food back. He is easy when the stomach is empty, and never at any other time. On examination, a tumour is palpable, and on slight inflation peristaltic waves are visible. Operation October 14, 1908. A large tumour occupying the lesser curvature up to the pylorus, and extending down both surfaces. Partial gastrectomy. The growth was malignant, and had begun in a saddle-shaped ulcer.

Mrs. A., aged forty-five, sent by Dr. Horsfall, Slaithwaite,

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seen July 10, 1907. The patient says that she has suffered from her stomach "all her life." When asked to be more precise, she says that she remembers very well an attack when she was twenty years old, and that was not the first. In an attack pain came about one hour after food; the pain was worse after heavy foods, but came more quickly after liquids. Vomiting at first did not occur, has since been frequent, but has always brought relief. No blood has been seen at any time. In the intervals between attacks she feels very well; the longest interval was rather more than a year in duration. The last attack began at Christmas, 1906. The pain was of the same character, but became by degrees more severe. Diet was restricted to fluids, but pain persisted, and recently has been almost constant. Vomiting has been frequent during the last few weeks. Has lost in this attack 20 lb. Does not improve with the same treatment as before. I operated upon her on July 19, 1907, and performed partial gastrectomy. There was a large prepyloric growth; a great many glands in both omenta, and the right suprapancreatic glands and the subpyloric group were especially large. The patient died in September, 1908, having had three "fits" on the two days preceding her death.

In 3 cases in my series perforation of an ulcer had occurred twenty-six, ten, and four years previously. In the first case the perforation had been of the "chronic" type, and a perigastric abscess had formed. In the others the history suggested that the perforation had been of the "subacute" type, and the conditions found at the operation lent strong support to this view.

SYMPTOMS OF CANCER.

This being the early history, what are the symptoms which are present in the final attack which proves to

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be due to malignant disease? The patient notices, by almost imperceptible degrees, that the relief which has formerly come for a brief period after a meal is curtailed, that pain comes more speedily or is not relieved at all. It is not long, therefore, before food is taken in lesser quantity, and becomes restricted to fluid forms alone. There is often a distaste for meat, especially for fat meats, as observers long ago noticed. The zest for food is lost entirely, and there is often a positive repugnance to it. While the ulcer is still simple, there is rarely a distaste for food; on the contrary, there is often a feeling of great desire for food, but experience has shown that indulgence is followed by distress or pain. I have commonly heard it said, "I could eat anything, but I dare not." In patients suffering from well-established cancer this is never heard; the cry is always that the thought of food is abhorrent, and it is difficult to persuade a patient to overcome his intolerance. There is, then, little or no freedom from pain, and a sense of uneasiness, or "sinking" in the epigastrium; yet the pain is never severe, is often not a matter of complaint at all. Food which has been taken "lies heavily" on the stomach, and regurgitation of it may occur, and a nauseous, bitter, but not acid, taste is noticed. An early symptom I have often observed is the copious discharge of an acid or bitter fluid from

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the stomach into the mouth. There is often much flatulence and eructation of gas. There are times when the gas and the vomited matters are unendurably offensive. The lessening of the size of the stomach by the discharge of either gaseous or fluid contents always brings relief. Very early in the attack anæmia is seen; it is not, as it may have been before, the anæmia which can be attributed to a large and noticeable loss of blood; it is rather a gradually deepening pallor, the face seeming of a whiter colour than the rest of the body. It is not infrequent for the colour to be of the faintest yellow tinge, and the resemblance to the hue of pernicious anæmia is very close. In all such cases there is a continuing loss of blood, as examination of the stomach-contents removed by the tube, or of the fæces, will show. Anæmia is, perhaps, the most striking of all the signs which indicate the onset of carcinoma in the stomach. The appearance of the patient with pallid, shrunken face, and features preternaturally sharp, the skin being dry and harsh and withered, will often rouse the first suspicion of the gravity of his disease. Loss of weight is continuous; at first it, perhaps, hardly attracts attention, but as soon as note is taken of it, a steady and unchecked wasting is observed. General weakness, indifference to many of the affairs of life

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which formerly held an absorbing interest, languor and lassitude are all seen in greater, than in less, degree. Such is the complete picture seen in the majority of the cases of carcinoma. A discrimination of two distinct types can usually be found in all cases where the pyloric half of the stomach is the seat of disease. These I would designate as cases of "pyloric" and of "prepyloric" growth. In the former the symptoms almost from the first suggest the presence of a hindrance at or near the pylorus. Vomiting is among the very early symptoms, and dilatation of the stomach, with stagnation, and the periodic return of the long-delayed food, occur. These cases are recognised early, owing to the inability of the patient to take food, either solid or liquid, with comfort, and to the overt character of the cardinal symptom—vomiting. The danger is in mistaking, as I have unhappily done, on more occasions than one, the growth for a chronic ulcer. A palliative operation, gastro-enterostomy, is then performed, when a radical operation, partial gastrectomy, is needed. In the "prepyloric" form the symptoms are such as I have already described; they are general and constitutional rather than local, and are, therefore, less compelling in their interest. The ulcer, and the growth which follows it, are found upon the lesser curvature away from the pylorus; the ulcer has probably been,

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and may often be shown to be, saddle-shaped, and consequently a high degree of obstruction does not come till late. The mere presence of a growth on the lesser curvature—or, indeed, of an ulcer also—seems to do something to impede the passage of food onwards, possibly by entanglement of the nerve-supply; a zone of muscle of lessened power offers obstruction in some sort, and causes both stasis and vomiting.

In the third group the patients, who are generally between forty and forty-five years of age, give a history which, in all its essential details, is identical with that in Group 2. But there is one significant omission. No history of any illness which can be referred to a structural lesion in the stomach can be elicited. The whole clinical course is comprised in the one sustained illness which, without haste but without pause, has brought the patient into a condition of serious ill-health. The symptoms in their earlier stages are pain, which appears sooner or later after food, and is worse after solid food to such a degree that liquids soon form the whole dietary; occasional vomiting, and possibly hæmatemesis or rarely melæna, and loss of weight. There is nothing alarming or particularly distressing in the symptoms, but it is their persistence rather than their prominence which finally attracts attention. Wasting anæmia and perhaps vomiting become con-

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spicuous, and at last it is realised that the patient is probably attacked by some serious organic disease.

At the operation carcinoma is found, and, most important point of all, the growth, in my experience, is sometimes found to be in the site of a chronic ulcer. In this group of cases there is no suspicion, clinically, or only a very vague suspicion, that a chronic ulcer of the stomach has ever been present. It is the pathological disclosures which make it probable or certain that in many an ulcer has formed, an ulcer which at the moment of its full development has straightway become invaded by an insidious malignant process. The change which occurs in this ulcer is in every feature the same as that which is noticed in the cases in Group 2; but in these the change comes in the first life of the ulcer, in the others only after it has many times healed and as often broken down again. The following is a good example:

Mrs. B., aged forty-six. Sent by Dr. McLeod, Outwood. Seen by me October 10, 1908. The patient had been perfectly well up to six months before. She then began to suffer pain one to one and a half hours after food; vomiting occurred shortly afterwards, and always gave some relief. There was never hæmatemesis. The pain gradually increased in severity, and latterly had been much worse after solid food, especially meat. At first there were periods during which she felt quite well, but lately the suffering has been continuous, and weight has gradually been lost to the extent of 11 lb. On examination there

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was a dilated, visibly acting stomach, and a lump the size of a hen's egg was palpable at the pyloric end of the stomach.

Operation.—The palpable tumour was seen to be a mass of malignant glands ("subpyloric" group). On the anterior surface of the stomach, close to the pylorus, was a hard round scar, with radiating puckers from it. Partial gastrectomy. Recovery. An examination of the specimen showed a large chronic ulcer of the stomach, at the lower part of which the edge was raised into a mass the size of a Barcelona nut. This was malignant, as also were the glands underlying it.

RELATION OF GASTRIC ULCER TO CANCER.

In the remarks I have already made I have done something more than hint at the connexion between ulcer of the stomach and cancer. Are we entitled to say that there is any proved connexion between the two? If we are, then chronic ulcer of the stomach must be ranked among the "precancerous" conditions; and if, further, the connexion be proved to be of either moderate or large frequency, cancer of the stomach is surely robbed of some of its terrors, for it is doubtless then to be enrolled among the preventable diseases. What is the evidence? In a previous paper, read before the Clinical Society of London in February, 1906, I collected and analysed all the cases of cancer of the stomach (58 in number) upon which I had operated up to July, 1905.¹ In the last 22 cases a history of chronic gastric ulcer was clearly obtained in 16; in one case there had been a subacute perforation of an ulcer on

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the lesser curvature near the pylorus. In one case the "attack" of gastric ulcer had occurred twenty-six years before; in the interval the health had been good and digestion sound, though care had always been exercised in the matter of diet.

Almost identically the same proportion has held good for my later cases, numbering over 100, and I am therefore in a position to say that of all patients operated upon by me for cancer of the stomach, approximately two in every three have had a history of previous gastric ulcer. In the majority of those who give this history there has been a constant succession of attacks, similar in all their chief manifestations and brought about by similar causes. In the last attack the symptoms have been of a graver nature, more protracted, not amenable to the treatment, nor relieved by the drugs which proved successful before; and by degrees it has become unmistakable that this attack is likely to prove of a far more serious character.

From the clinical point of view it is, therefore, certain that we must look for the inaugural symptoms of cancer of the stomach rarely among those whose former health has been good, often among those whose anamnesis tells sometimes of one, but, as a rule, of many attacks of "dyspepsia" or "indigestion," as they may be called. These attacks of pain come after food, are

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definitely related to the taking of food, are eased for a time by food, and there are also vomiting, inability to take or temporary dislike for solids, and loss of weight; the attacks, that is to say, are clearly to be referred to the presence of a chronic gastric ulcer. If, therefore, we are to concentrate our attention upon the early symptoms of cancer of the stomach, it is the patient whose stomach has long been a source of trouble to him that must chiefly engage our attention. But it is necessary to say that this patient, who is, so to speak, the most promising candidate for carcinoma of the stomach, can be prevented from developing this horrible affliction by a timely attention to the earlier simple disease. Cancer of the stomach, if it follows in the majority of cases upon chronic ulcer of the stomach, is so far, and in such numbers, a preventable disorder. In the surgical treatment of chronic gastric ulcer by the performance of gastro-enterostomy, or of Rodman's operation, may be the means of destroying the chances of a late malignant change from an early simple condition. It has often been said that "the onset and persistence of dyspepsia in a man over forty years of age, who had previously enjoyed good health, is a suspicious circumstance," pointing probably to the onset of carcinoma. I have found that in such cases the disease is more often simple than malignant, and

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that the lesion found is more frequently duodenal than gastric.

I am only too well aware of the doubt, even perhaps of the hostility, with which the suggestion has been received that ulcer of the stomach and cancer stand often in the relationship I have indicated. But impartial inquiry into the history of a long series of cases will support, I know well, the views I have expressed. Clinically, there can be no longer any substantial doubt of the connexion. Is there any valid pathological evidence to support the belief which clinical experience has stimulated? I have no hesitation in saying that the pathological evidence now available supports fully the contention I have stated. In what manner should we expect that evidence to be obtained? I venture to answer that it could only be obtained from specimens examined in an early stage of the disease, at a time when the primary simple disease and the later cancerous change can be seen together. It is, then, necessary also to show that the former condition is earlier than the latter. A moment's thought will convince one of the truth that a specimen of this kind is hardly to be found upon the post-mortem table in the body of one who has succumbed at last to the steady and unchecked extension of a malignant growth. The only specimens which are likely to furnish valid evidence must be

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obtained by operation. The best of these specimens are found when a chronic ulcer, as the appearance suggests, is removed by Rodman's operation. Though no suspicion of malignancy may have crossed the surgeon's mind, the pathological examination will disclose the undoubted evidence of early malignant disease in an area where the ancient marks of simple disease are plainly to be seen. In this connexion one cannot but offer a tribute to the remarkable work which has been done in the clinic of Dr. W. J. Mayo and Dr. C. H. Mayo at Rochester. I had the privilege a few months ago of seeing the specimens of partial gastrectomy removed by them, and of having the pathological conditions demonstrated to me. No one who has seen the evidence there produced doubts any more that cancer of the stomach is frequently the offspring of an early simple disease. Dr. W. J. Mayo² has recorded the fact that, in 180 cases of resection of the stomach, cancer was demonstrated to have sprung up in the base of an ulcer in 97; that is, in 54 per cent. My own experience supports this statement fully; indeed, I have myself found the percentage even a little higher in my recent cases.

The connexion between chronic ulcer of the stomach and carcinoma I hold, therefore, to be established so far as Group 2 is concerned. Is there any relationship

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between the acute cases of cancer of the stomach, cases which seem to have in them something akin to an acute infection, and ulcer? There is no history of chronic ulcer in this class of case; the disease seems to begin acutely and to spread rapidly; in my own work no permanent relief has ever followed operative treatment, and the benefit obtained by the palliative operation of gastro-enterostomy is too often quite inconsiderable. Recently I have come to believe it possible that in these cases also an ulcer may be the starting-point of the malignant process. The ulcer in such cases is of the "acute" type; one or more "hæmorrhagic erosions" are present, and in these cancer is deposited and spreads there with the most intense rapidity.

If carcinoma should be conclusively proved to be the final change in the long series of changes which have led up to and established a chronic ulcer in the stomach, is it not in this case merely repeating the experience we have gained of its habits in other parts of the body? We know how frequently cancer of the tongue develops as a last change in a series of conditions all of which are simple. It is only the bare truth to say that cancer almost never develops in a tongue previously healthy; where a malignant ulcer is present, other changes are seen around it, and these have been present, always for months, often for years. Cancer is there only a

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local exaggeration of or a later change in a condition of things distributed over other parts, or over the whole of the tongue. It is the same with the lip, and with the ulceration of old scars due to burns. The development of cancer on the corona as a result of the irritation of smegma retained by a too long and too tight prepuce was pointed out more than a century ago by the first William Hey, of Leeds. In the breast the transformation from chronic mastitis to malignancy is no longer doubted. In the gall-bladder it is commonly seen. And instances might easily be multiplied. Surely the one thing of which surgeons feel sure in respect of cancer is that it seems most often to occur in those parts where mild irritation has long been present.

EXPLORATORY INCISION.

A review of the cases which have been under my own care has convinced me that though the history, especially in so far as it tells of former attacks of chronic gastric ulcer, may awaken a keen suspicion as to the presence of a carcinoma in the stomach, and though all the contributory evidence to be derived from the chemical examination of the stomach contents may go towards a confirmation of the diagnosis, there is only one means of making an assured diagnosis in an early stage. An inspection of the parts, and this

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alone, and that indeed not always, can give us the information upon which a probable diagnosis can be made. It is necessary for us to realise that by any other methods than this one a positive diagnosis of cancer in the stage when it is capable of successful treatment is almost impossible. If the patients who are suffering from this most insidious and most terrible disease are to have any fuller prospect of relief, or of cure, the use of the exploratory operation must be greatly increased. I deprecate more strongly, I believe, than most surgeons the adoption of the "exploratory incision"; but every argument and all experience show that in cases of carcinoma of the stomach no other method than this offers any slenderest hope for the betterment of the present deplorable condition of affairs. But before we are entitled to advise any patient to undergo this operation we must be confident that there is a well-grounded suspicion that some condition not admitting of remedy by any other than surgical means will be found.

INDICATIONS FOR OPERATION.

I think that an operation should be advised in the following circumstances:

(a) In all cases of chronic gastric ulcer. The recent experience of surgeons has shown that a diagnosis of

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chronic gastric ulcer can be made with great accuracy, and that not only the presence, but also the position, of the ulcer can be accurately predicted. When repeated "attacks" occur, it is idle to consider any other than operative treatment, for nothing else can give permanent relief. In any attack occurring in a patient over forty years of age the need for surgical intervention is becoming urgent.

(b) When gastric stasis is present. This is a condition the existence of which is easily determined. If there are symptoms suggesting structural disease in a stomach incapable of emptying itself completely in from ten to twelve hours, then the conditions which exist are mechanical, and can be remedied by none other than mechanical means.

(c) When a tumour is present. The tumour may be simple or malignant, but research is better conducted by inspection than by any other means at our disposal.

In these three conditions medical treatment may do something to relieve: it can do nothing to cure. There is accordingly no reason for delay in advocating operation. If this is done, and done early, many cases of carcinoma that now drift quietly into the inoperable stage may be saved.

The position seems now to be this—that there are no signs or symptoms clearly indicative of the presence

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of gastric cancer; there is no refinement of clinical inquiry nor any endowment of clinical acumen which will enable a confident diagnosis to be made in an early stage; inspection of the stomach during an operation carried out when definite faults in its working are known will permit of the early discovery, or of the prevention of a certain proportion of the cases of cancer. The surgeon must not ask the physician for a sign which will reveal the presence of this disease to him, but he can and should require that those conditions which are only to be remedied by operative measures should be referred to him not in their advanced or terminal stages, but at the earliest moment of their recognition. The success which has followed the surgical treatment of gastric disorders justifies this simple request.

CHEMICAL ANALYSIS OF GASTRIC CONTENTS.

A point which cannot be ignored in any discussion upon the early recognition of cancer of the stomach has reference to the condition of the stomach contents. Much has been written with regard to the value of a chemical examination of the stomach contents in cases of gastric carcinoma. It is my practice to have all stomach cases examined as a matter of routine, and I place some reliance upon the results so afforded. But it is necessary that more examinations than one should

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be made, and that the circumstances should be changed in some of the examinations. The fluids removed from the stomach after several hours of fasting, after a test meal preceded by lavage, and after a meal consisting chiefly of albumens should be examined. The characteristic result in cases of cancer shows absence of free HCl, a diminished total acidity, the presence of lactic acid, and the presence of Oppler-Boas bacilli. Briefly stated, my opinion is that the early diagnosis of carcinoma of the stomach receives only the slenderest help, if indeed it receives any, from those examinations; whereas, in the later cases, a suspicion of malignancy receives strong confirmation if the characteristic conditions I have named are found.

CONCLUSIONS.

I would endeavour to sum up my knowledge of cancer of the stomach, as revealed to me by a study of the cases which have come to me for surgical treatment, in the following propositions:

1. Cases of cancer of the stomach when examined in regard to their previous history may be divided into three groups: (a) Cases, generally acute, in which the symptoms appear suddenly and progress rapidly; the whole history may be confined within a space of four to nine months. (b) Cases in which there is a history

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of one ancient attack, or of repeated attacks, due undoubtedly to the presence of a chronic gastric ulcer.

(c) Cases in which there is no previous history of gastric ulcer; in some of them a condition of "ulcus carcinomatosum" may be found.

2. The acute cases are not seldom ushered in by an attack of severe hæmatemesis, with or without melæna. It is possible that such copious bleeding is dependent upon multiple hæmorrhagic erosions.

3. The importance of a history of repeated attacks of indigestion, alike in their origin, course, and termination, cannot be exaggerated. Such attacks are due to a chronic gastric ulcer, which at last becomes malignant.

4. Cancer of the stomach, in so far as it depends upon a chronic ulcer for its origin, is a preventable disorder. It is probable that two-thirds of the whole number of cases may be so classed.

5. The final attack is distinguished from former attacks by its lingering character, its rebellion against the treatment, dietetic and medicinal, which has proved helpful before, but chiefly by the presence of a profound distaste for food, anæmia, and a progressive loss of weight.

6. The chemical examination of stomach contents is of little or no value in so far as early diagnosis of car-

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cinoma of the stomach is concerned. In the later cases, when a possible diagnosis of malignancy is made on the clinical evidence, the results of repeated chemical analyses of the stomach contents afford additional evidence of considerable value.

7. Surgical treatment should be advised in all cases of stomach disorder where there is obstruction, stasis, or tumour, and in all cases of chronic ulcer; in this way early cases of carcinoma will be found, and radical treatment will be possible.

8. There are no symptoms, and there are no signs which, individually or collectively, permit of an assured diagnosis of cancer of the stomach in an early stage. In cases where there is grave suspicion an exploratory operation should be advised. Such operations should be practised to enable a diagnosis to be made in an early stage, not to confirm an almost certain diagnosis in a hopeless stage.

The surgical treatment of cancer of the stomach is now based upon sound principles, as a result of the work of many labourers in different fields. When the growth is seated at or near the pylorus, or along the lesser curvature of the stomach (and these are the cases we are chiefly considering), the anatomical and pathological investigations have indicated certain essentials to be observed in order that the whole

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growth, and the lymphatic area in connexion with it, may be eradicated in accordance with those principles now generally held to be necessary in dealing with any form of carcinomatous disease.

After a study of all the factors, we are in a position to lay down the lines upon which an operation for the removal of a malignant growth beginning in the pyloric region of the stomach should be based. It is essential that the whole growth should be taken away, and such a margin beyond the visible and palpable tumour as shall ensure that the outlying nodules are within the lines of section; that all the lesser curvature, that one-half of the greater curvature, and that an inch at least of the duodenum should be removed; that all the "primary" glands at least should be taken (these are the lower and upper coronary, the right paracardial, the suprapyloric, the right suprapancreatic, the right gastro-epiploic, upper and lower, and the retropyloric). The removal of all these parts is possible, and therefore the somewhat mournful view of the possibilities of the surgical treatment of cancer of the stomach taken by several writers is not justified. The difficulties to be encountered will chiefly lie in the removal of the right suprapancreatic glands, but that these difficulties are exaggerated is, I think, quite certain. In several cases I have, by using the "gauze stripping" method,

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removed the glands without any injury either to the hepatic artery or to the pancreas.

The following are the steps of the operation, as briefly outlined as possible:

1. The free opening of the abdomen in or near the middle line; the inspection of the parts; the packing of swabs around the area to be engaged in the operation, so as to avoid any soiling of the parts. Nothing except the viscera at the moment engaged in the operation should be visible.

2. Preliminary ligature of the pyloric, gastro-duodenal, and left gastro-epiploic arteries (not the coronary), division of the gastro-hepatic omentum close to the liver.

3. Division of the duodenum between clamps, and the use, on the distal side, of a suture to close the duodenum by infolding. On the proximal side the exposed mucosa is well seared with the cautery, and a stitch taken round the clamp to prevent it slipping.

4. Ligature of the gastro-hepatic omentum below all glands in the greater curvature. The most important point is now to see that the middle colic artery is not wounded. The omentum is ligatured up to a point just beyond the middle of the greater curvature, so that all glands are removed.

5. The stomach is now turned well over to the left,

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and the coronary artery ligatured at its origin from the cœliac axis. At once the lesser curvature is freed, and the stomach can be pulled lower. In this way all the coronary glands remain with the stomach.

6. Performance of posterior gastro-enterostomy. This is done before the stomach is cut away, being then far easier.

7. Division between clamps of the stomach from the œsophagus at its right margin to a point a little to the left of the middle of the greater curvature.

8. Cauterisation of the exposed mucosa of the stomach and closure of the cut end of the stomach by a double suture.

9. Toilet of the peritoneum and closure of the parietal wound.

The size of the growth at or near the pylorus has no influence upon the extent of the resection. For the very smallest growth a resection to this extent is needed. If the growth invades the body of the stomach, it may involve the removal of all of the stomach but the isolated area, after the manner described by me several years ago.

REFERENCES.

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Remarks Upon the Surgery of the Common Bile-duct.*

THE subject that I have chosen for the address which, by your courtesy, I have the honour to deliver to-night is "The Surgery of the Common Bile-duct." Experience in this branch of surgery has been rapidly accumulating, and a brief survey of the work which has already been done is not undesirable. An occasion of this kind affords a definite stimulus to a scrutiny of one's own work and gives an incentive and an opportunity both for comparison with that of others and for a review of the whole subject.

The common bile-duct is rather more than 3 inches in length; it extends from the junction of the cystic and common hepatic ducts downwards and to the right in the free edge of the gastro-hepatic omentum to its termination in the second portion of the duodenum, where it bears a relationship to the opening of the canal of Wirsung, the duct of the pancreas. As a

* An address delivered before the Nottingham Medico-Chirurgical Society on Oct. 18, 1905, and reprinted from the *Lancet*, Jan. 20, 1906.

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rule, three portions of the duct are described: (1) the supra-duodenal portion; (2) the retro-duodenal portion, or the pancreatic portion; and (3) the trans-duodenal portion.

1. The supra-duodenal portion varies from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in length. It lies in the free edge of the gastro-hepatic omentum, having the hepatic artery to the left and the portal vein behind. It is the widest part of the duct, which in its whole course is funnel-shaped, gradually narrowing from its origin to its termination. The point of chief surgical importance is the fact that along this portion of the duct three or four lymphatic glands lie. These in their enlargement may come to resemble stones; indeed, they cannot always be distinguished from stones by touch alone.

2. The retro-duodenal portion is from 1 inch to $1\frac{1}{4}$ inches in length. It is in close relationship with the pancreas, lying either in a groove in the gland or actually traversing its substance. Helly in 40 cases found that the duct lay in a groove in 15 cases and was embedded in the gland in 25. Bungler in 58 cases found that in 55 the duct was embedded, in three only was it partially uncovered by the pancreas.

3. The trans-duodenal portion, about from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in length, consists of that portion of the duct which lies within the wall of the duodenum. In order

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to open the lumen of this portion of the duct from within the duodenum the wall of the bowel has therefore to be cut *into* but not *through*.

The common duct at its termination in the duodenum is associated with the termination of the duct of Wirsung in a manner that is liable to variation. The two ducts are surrounded by a circular band of muscular fibres described as the "sphincter of Oddi." Letulle and Nattan-Larrier described four varieties in the mode of ending of the common bile-duct and of the pancreatic duct in the duodenum. First type (2 cases in 21): There is a complete absence of any projection or raising up of the mucosa. A longitudinal furrow from 2 to 3 millimetres long, with prominent lips, surrounding a circular or oval opening, is seen. This opening is the termination of the common duct. The canal of Wirsung opens into the common duct at a variable distance from the intestine. Second type (6 cases in 21): it forms the "perfect model of the ampulla of Vater." At the opening into the intestine there is a slight projection on the surface of the mucosa, from 7 to 12 millimetres in length. The opening is circular or elongated vertically, and at its largest measures 3 millimetres in length. The two ducts terminate in a cavity more or less circular, the measurements of which are, in a vertical direction, from 4 to

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6 millimetres, and in the transverse from 6 to 7 millimetres. Before opening into the ampulla both ducts are narrowed for a few millimetres. As a rule, the common duct lies near to the duodenum in this type and can be felt as a vertical ridge beneath the mucosa. Third type (8 cases in 21): This form is characterised by the presence of a very slight elevation on the surface of the duodenum, by a shallow fossa or gutter situated immediately below the point of opening of the ducts, and by the non-confluence of the two ducts before their termination. There is, therefore, no ampulla. The extent of the gutter or trough which surrounds the lower parts of the ducts at their terminations varies very greatly in different cases. The two ducts lie together at their termination like the two barrels of a gun; the pancreatic duct may be below and behind or below and in front of the common duct. Fourth type (4 cases in 21): In this form there is a prominent papillary projection, on the summit of which the two ducts open side by side, separated by a vertical partition; there is no ampulla. In some cases the opening of the canal of Wirsung may be crescent-shaped, the opening of the common duct lying in the hollow of the crescent. It will be seen that from the surgical point of view it is a matter of the greatest importance to recognise these varieties of form; the ob-

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struction of the lower part of the duct in the first variety would involve an implication of the pancreas; the obstruction of the orifice of the ampulla in the second variety would convert the common duct and the canal of Wirsung into a single channel, whereas in the third and fourth forms the ducts are strictly separate. The conditions in which surgical interference with the common duct is called for are: (1) rupture of the duct; (2) calculus and in inflammatory conditions caused by other agents; (3) stricture; (4) new growth; and (5) pressure upon the duct from without.

1. RUPTURE OF THE COMMON BILE-DUCT.

Rupture of the common bile-duct may be the result of *injury* or of *disease*.

(a) *Traumatic rupture* of the common duct is always subcutaneous; so far as I am aware no case has been recorded as the result of a penetrating wound. Traumatic subcutaneous rupture probably occurs more frequently than the recorded cases would lead one to believe. The number of the cases in which a laceration or rupture of the duct has been discovered either during an operation or upon post-mortem examination is small, but cases similar in all the details of their clinical history to these have recovered after the abdomen has been aspirated and large quantities of bile or deeply

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bile-stained fluid have been evacuated. A rupture of the duct in these instances, though, of course, not certain, was at the least extremely probable. The bile-duct may be torn at any part of its course and the rent may be small or the duct may be completely severed. The laceration, when small in size, may involve the anterior or the posterior wall; a large tear or a complete division of the duct is the condition generally found. As soon as the duct is torn, bile escapes into the peritoneal cavity and before long sets up a responsive peritonitis. The result is that in the earliest days a very copious deposit of lymph is found in all the parts in the neighbourhood of the duct. The under surface of the liver is plastered with thick layers of lymph, the intestines, the duodenum, and the stomach especially, are all coated over with lymph, which can be peeled off in thick strips. The bile escaping from the duct may run free in the peritoneal cavity or its passage may be checked by barriers of lymph; an encysted swelling then results. It is interesting to note that this abundant deposit of lymph occurs only, or at least chiefly, after a traumatic rupture of the common duct. When the hepatic duct or the gall-bladder is torn, lymph is formed in most cases, but neither so rapidly nor so freely as when the common duct is involved. The reason for this may be found in

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the different condition of the bile as regards the presence of micro-organisms. Gilbert and Lippmann¹ investigated the condition, so far as concerned micro-organisms, of the bile in the extra-hepatic ducts in animals. The middle and lower thirds of the common duct were found to contain both aërobic (including the *bacillus coli communis*) and anaërobic organisms, but in the cystic duct and gall-bladder, only anaërobic organisms were found. The numbers of these organisms diminished gradually towards the upper part of the hepatic duct. It seemed clear that the infection of the bile-passages proceeded upwards from the intestine. Bile poured out, therefore, from either the hepatic duct or the gall-bladder would prove less irritating to the peritoneum than that escaping from the common duct, and would call forth a less vigorous response from it. This abundant deposit of lymph prevents the resorption of bile by the peritoneum. But for this the bile would be rapidly absorbed and give rise to symptoms of toxæmia. In a series of experiments upon dogs Erhardt ligatured the common duct immediately above the duodenum and, from the ligature, slit the duct upwards to the hepatic duct. The animals died within from two to six days from deep jaundice and profound symptoms of toxæmia. No evidences of peritonitis were present. The bile ab-

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sorbed rapidly by the peritoneum caused death from poisoning, the harmful constituents of the bile being, according to Biedl and Kraus, the bile-acid salts. In Erhardt's experiments it was found that if at the time of the operation a culture of the bacillus coli was introduced into the peritoneum, a plastic peritonitis resulted. Bile was therefore absorbed far more slowly, jaundice was slight and slow in appearing, and the animals survived for fourteen days or longer. It would appear, therefore, that in rupture of any part of the bile-passages two dangers are to be apprehended—one from the absorption of the bile the acid salts of which are poisonous, the other from infection by organisms escaping through the distal torn end and coming from the duodenum. These organisms, in so far as they excite a fibrinous peritonitis, are helpful rather than harmful. It is interesting to note that suppurative peritonitis, either general or local, has not been observed in any case so far recorded. Infection with organisms (probably the bacillus coli) is therefore slight. The deposit of lymph upon and around the common duct may cause the complete sealing up of the rent, so that when an operation is performed no further escape of bile is perceived and the source of that which has already escaped may be difficult to discover. In Battle's case, for example, the laceration was hard

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to find post mortem on account of this coating of the parts with lymph. In one case of rupture of some part of the bile-passages Routier opened the abdomen, drained away all the deeply bile-stained fluid, and found the under surface of the liver and gall-bladder and all the region of the ducts firmly surrounded by thick deposits of lymph. No bile could be seen to issue from any point. After thoroughly drying the peritoneum with swabs, Routier closed the abdomen completely and the child made a perfect recovery. The detailed history in this case shows unquestionably that a rupture of the bile-passages had occurred, and affords a proof seemingly conclusive that the secure healing of a duct may be accomplished through the agency of the lymph. A case is recorded by Thompson, of Edinburgh, in his work on "Diseases of the Liver," in which the bile-passages at some part would seem to have been ruptured. After the usual course of symptoms the abdomen was tapped and 16 pints of bile were withdrawn. At the post-mortem examination no lesion of the bile-passages or of the liver was discoverable. There was a new "false membrane" covering the ducts and lymph was deposited everywhere.

Symptoms.—The symptoms and signs caused by a rupture of the common bile-duct are jaundice, the absence of bile in the stools, the gradual distension of

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the abdomen by fluid, and wasting. In 2 cases out of the total number of 12 recorded, death occurred from shock or collapse when no symptoms of any kind other than these had had time to develop. The patients were almost all young children, only 4 being over twenty years of age and 5 being under six years of age. The accident was generally due to the patient being run over, or kicked, or struck in the abdomen. Jaundice is a variable symptom; it may come on within the first few days or its appearance may be delayed for a fortnight. In at least one case, that of Hahn, it was never present. In Porter's case and in Stierlin's jaundice disappeared after the abdomen had been tapped and a large quantity of bile evacuated. The jaundice is never profound; in most of the records it is stated that the jaundice was "slight" or that the skin was "lemon coloured." The colouring of the skin is due to the absorption of bile by the peritoneum. As soon as lymph is poured out, the absorption ceases or is reduced considerably, and the jaundice then remains stationary or fades slowly away.

Bile is absent from the fæces in all cases of rupture of the common duct. All the bile passing down the duct escapes at the point of rupture. Though these statements are accurate in so far as they concern the cases in which the presence of a laceration of the duct

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has been verified by operation or by post-mortem examination, it cannot be open to doubt that in some cases a rent in the duct has been closed by the deposit of lymph and the patency of the canal restored. The case of Routier, quoted above, is possibly one exemplary instance of this. In the records of the 12 verified cases it is noticed that the stools were "clay-coloured," "pale grey," or "alcoholic" in 9; in 1 no record was made, and in 2 death occurred from shock too early to admit of any observations upon this point. During the time that jaundice is present there may be bile in the urine, though this is not necessarily the case. The bile, though unable to reach the intestine, does not necessarily become absorbed by the peritoneum to an extent sufficient to cause either jaundice or staining of the urine.

The gradual distension of the abdomen by fluid is a constant feature in all cases. In 10 of the 12 cases (2 patients dying from shock) a slow accumulation of fluid in the abdomen was observed. The fluid when aspirated was found always to be bile or fluid deeply bile-stained. The bile escaping into the peritoneum may flow over the whole cavity and fill every part of it, as does the fluid in a case of ascites. Or if the sero-fibrinous peritonitis be rapidly set up, barriers of lymph may confine the fluid to a limited area of the abdomen,

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the rest being free. A local swelling, generally in the right hypochondrium, then results. In one case (Drysedale's) the fluid filled the right side of the abdomen and the greater part of the pelvis, and the wall of lymph was so firm and so complete that the recorder speaks of a "cyst," into which the common duct opened at the point of rupture.

A rapid loss of flesh is noted as having occurred in most of the cases, and in some the emaciation is spoken of as being "extreme." The temperature is generally normal, increasingly worse as the abdomen enlarges.

So far as the differential diagnosis is concerned, it would seem that an accurate discrimination between rupture of the hepatic or common ducts and rupture of the gall-bladder should be possible. When either of these ducts is torn, the whole of the bile escapes into the peritoneal cavity and the stools are colourless; if the gall-bladder be torn, bile can still flow unhindered along the ducts into the intestine, and the colour of the stools is normal or, owing to the escape of a part of the bile through the gall-bladder, is only slightly paler than is natural.

Treatment.—In all the cases so far recorded no treatment has been adopted in the days immediately following the accident. It is only when the abdomen has

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become greatly distended by fluid that aspiration or incision has been contemplated. In one case, that recorded by Rose, no less a period than nine months elapsed between the receipt of the injury and the operation. If the circumstances were such that a diagnosis could be made early and operation undertaken promptly, the results would be more satisfactory than they are, but the injury received is rarely such as to do damage to other parts than the common duct, the shock and collapse pass off rapidly, and the general and local conditions improve so decidedly that no question of surgical treatment arises. It is only when jaundice, faecal acholia, and, above all, the general distension of the abdomen, are recognised that the diagnosis is assured. If early operation could be performed, then end-to-end suture, or partial suture with drainage, as in choledochotomy, might be performed. In some of the cases—Porter's and Stierlin's—the distal end of the common duct could not be found even after the most careful search; in Stierlin's case, indeed, the distal end could not be discovered even at the post-mortem examination. In such circumstances ligature of the proximal end of the duct and cholecystenterostomy might be performed, or the proximal end of the duct might be implanted into the duodenum. In those cases in which the conditions

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are so serious that the simplest and speediest operation is alone permissible the bile must be emptied out as thoroughly as possible and a large drainage-tube be introduced. Courvoisier suggested that when the common duct was completely ruptured, tubes might be passed into each torn end and left hanging out from the abdominal incision. When adhesions around the tubes had shut them off from the general peritoneal cavity, the tubes could be removed and the bile might then find its way from the upper to the lower opening and the biliary fistula gradually close.

(b) *Pathological rupture of the common bile-duct* occurs generally as the result of the presence of a foreign body. Inflammation, softening and distension of the walls, and finally ulceration are set up and the duct at last gives way. The rupture of the duct may occur into the general peritoneal cavity; or into a localised mass of protective adhesions, an abscess then resulting; or the outer surface of the duct before rupture occurs may have become strongly adherent to a neighbouring viscus into which the perforation takes place, with the formation of a fistula.

Including the cases collected by Courvoisier, there are 11 instances of perforation of the common bile-duct into the general peritoneal cavity; in 6 cases stones were present, in 3 ascariides, and in 2 no foreign body could

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be found. In all the clinical course was rapid and death occurred from acute peritonitis; in one case there was profuse hæmorrhage, possibly from ulceration into the portal vein. An interesting example of rupture of the common duct into the peritoneal cavity, causing death from peritonitis, is recorded by Janeway.² In some cases the perforation of the duct is subacute, an abscess being slowly developed. The spreading of this gives rise occasionally to a subphrenic abscess, or the local abscess may rupture and cause a diffuse septic peritonitis, or the abscess may open secondarily into the colon³ or upon the abdominal wall, an external biliary fistula being formed.⁴

When the common duct has become adherent to a hollow viscus or the perforation has occurred from the third portion of the duct, a fistula results. I have operated upon fistulæ connecting the common duct and the gall-bladder and the common duct and the duodenum. A choledocho-duodenal fistula may connect the second or the third part of the duct with the bowel. The "wide-mouthed opening" of the common duct into the duodenum seen in cases of old-standing obstruction of the duct by a calculus is in reality the opening of a fistula through which the stone has ulcerated into the bowel.

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2. STONE IN THE COMMON DUCT.

A stone lodged in the common duct causes an obstruction which is either *complete* or *incomplete*: complete when the stone has just entered the duct, which it fits tightly, preventing any drop of bile from passing it, incomplete when the stone has been in the duct for some weeks or months, when secondary changes in the duct, such as softening and dilatation, have occurred, and when, therefore, the stone no longer fits the duct tightly but lies loosely within it, permitting the escape of bile by its side. In other words, an acute obstruction of the duct is complete and a chronic obstruction is incomplete. In the majority of cases of calculous occlusion of the duct there are more stones than one. Courvoisier in 149 cases found that there was a single calculus in 95, that there were two calculi in 36, and that there were 12 stones or more in 18 cases. The experience of most surgeons, however, is different from this. When choledochotomy is performed, a solitary stone is found in only about 1 case in 4. Courvoisier in 123 cases found that the position of the stone or stones blocking the duct was as follows: in 17 cases at the commencement of the duct; in 19 cases in the middle of the duct; in 20 cases near the duodenum (retro-duodenal portion); in 41 cases at the ampulla;

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and in 26 cases the whole length of the duct was blocked. Vautrin in 47 cases found that calculi were present in the part of the common duct above the duodenum in 27 cases; in the duct in contact with the duodenum in 18 cases; and in the ampulla in 2 cases. In some rare cases the whole of the common duct, from end to end, the hepatic duct, and all the intrahepatic ducts may be filled with stones very tightly packed together or with a sort of thick, tenacious mucus containing gall-stones innumerable.

Acute occlusion of the common duct from within is rare, except as a transient condition. When a gall-stone escapes into the common duct from the cystic duct it passes at once downwards into the funnel-shaped duct as far as it can before it is arrested. The larger a stone is, the sooner will progress be checked; the smaller a stone, the further will it pass. When a part of the duct is reached the lumen of which is so narrow that the stone cannot pass, it is arrested. It then fills the duct and blocks its lumen absolutely, allowing no drop of bile to escape by its side. The common duct is then as securely blocked as if tied with a string. But this condition of things does not long endure. Slowly but surely certain changes occur, the result of inflammation in the duct, softening of its walls, and the secretion pressure of the bile, which have

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the effect of giving rise to a dilatation of the duct, so that a stone which at first fitted tightly now fits loosely. The stone forms, as Fenger first pointed out, a sort of "ball-valve" in the duct. A complete occlusion of the duct is, therefore, in cases of stones, only an acute temporary condition. As the result of inevitable changes in the duct the obstruction becomes only a partial, incomplete one. In cases of stricture, simple or malignant, or of compression of the duct from without by enlarged glands or by the head of the pancreas involved in a carcinomatous growth, the complete obstruction of the duct may be permanent. A stricture of the duct may cause its absolute obliteration for a space of an inch or more; in such a state the occlusion is complete and permanent. In all cases where the block in the duct is complete the bile pent up behind the obstruction becomes gradually absorbed and the hepatic ducts and all the biliary ducts behind the occlusion become filled with clear, sticky mucus. The ducts are everywhere dilated.

The chief, and often the only, symptom of complete closure of the common duct is jaundice, deep and unchanging. In the earliest stages when the obstruction is developing pain may be present, but it is rarely or never severe and it disappears speedily. Jaundice in cases of obstruction by stone appears rapidly and

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attains its maximum within a few days; in cases of obstruction of the duct due to stricture, simple or malignant, or to compression by growth from without, the jaundice comes insidiously, deepens little by little, never lessens, but progresses always to its maximum intensity without any periods of remission. It is in these cases of complete obstruction of the duct that the diagnosis is difficult and at times even impossible. If time elapses without any onset of rigors or of variation in the jaundice, the likelihood of a stone being present is small; the obstruction then is probably due to malignant disease in or around the duct.

The condition of the gall-bladder in these cases affords a great help in achieving an accurate diagnosis. This point was first fully investigated by Courvoisier. He found in 187 cases of obstruction of the common duct that in 100 the obstruction was due to causes other than stone, and in 87 to the impaction of a stone. Of the 100 cases in which the obstruction was due to causes other than stone, in 92 there was dilatation of the gall-bladder and in 8 cases there was a normal gall-bladder or an atrophy of the gall-bladder. Of 87 cases in which the obstruction was due to stone, in 70 cases the gall-bladder was atrophied and in 17 cases the gall-bladder was dilated. All these cases were collected from the literature. Of the cases that came to opera-

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tion and were recorded by Courvoisier, 35 in number, in 18 the obstruction was due to causes other than stone, and in 16 of these there was dilatation of the gall-bladder, in 17 the obstruction was due to stone, and in 13 of these the gall-bladder was contracted. These observations of Courvoisier were formulated by him in the following statement, which is now generally referred to as "Courvoisier's law." "*In cases of chronic jaundice due to blocking of the common duct, a contraction of the gall-bladder signifies that the obstruction is due to stone; a dilatation of the gall-bladder, that the obstruction is due to causes other than stone.*" The validity of this law has been closely investigated and its truth has been affirmed by almost every writer. Ecklin in 172 cases of common duct obstruction due to calculus found that 28, or 16 per cent., had dilatation of the gall-bladder, and 144, or 84 per cent., had contraction of the gall-bladder. In 139 cases of obstruction due to other causes 121, or 87 per cent., had dilatation of the gall-bladder.

A further examination of the question has been made by Dr. A. Cabot, of Boston, who collected the records of the Massachusetts Hospital. There were 86 cases of obstruction of the common duct. Of these, 57 were due to obstruction by stone; in 47 the gall-bladder was atrophied, in 8 it was normal, and in 2 enlarged; 29

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cases were due to causes other than stone; in 27 the gall-bladder was distended, in 1 the gall-bladder was empty, and in 1 contracted around three stones. Only 4 cases, therefore, in this series did not fall in with Courvoisier's law. Cabot writes: "With the exception of these 4 cases, which constitute only 5 per cent. of the total number examined, every record of the Massachusetts Hospital series in which definite statements are to be found concerning the points at issue goes to confirm Courvoisier's law." The explanation given by Courvoisier of the occurrence of sclerosis of the gall-bladder in cases of stone was that the presence of calculi in the gall-bladder and their passage or attempted passage down the ducts had caused irritation and inflammation in and around the bile-passage. Cholecystitis and peritonitis were the result and had determined the cicatricial cramping and compression of the gall-bladder.

If persistent and unvarying jaundice is associated with enlargement of the gall-bladder, and inflammatory troubles, rigors, sweatings, elevation of temperature, and rapidity of pulse are also in evidence, then it is probable that there is a stone in the common duct and that cholangitis and cholecystitis are secondary to it, for infection of the bile-passages, though not impossible in cases of malignant disease, occurs far less frequently

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than when the obstruction is calculous. The presence of enlargement of the liver, especially of an irregular character, or of ascites will support a diagnosis of carcinoma.

Incomplete Occlusion of the Common Duct; Chronic Calculous Obstruction.—In the great majority of cases of obstruction of the common duct by stone the block is only a partial and intermittent one. At the first the occlusion, as I have pointed out, is complete, but after a time the stone is loosened and comes to act as a ball-valve. It then floats in the duct, upwards and downwards. At times it is pressed onwards, in part, perhaps, by the force of the bile behind it, in part also by the muscular contraction of the walls of the duct. As it passes further downwards it comes to a part of the duct whose lumen is not large enough to permit the further descent of the calculus. The stone is arrested there, gripped firmly, and for a time the block in the duct again becomes complete. Soon, however, the stone is floated upwards into the wider duct and bile escapes past it into the lower part of the duct to flow into the duodenum. The occlusion is then incomplete and remains so until the stone again attempts to pass downwards and is again arrested. The description given by Fenger of the “ball-valve” action of the stone is thus seen to be completely justified, for at times the

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passage of bile is absolutely stopped by the stone and at other times the bile can flow past the stone unhindered. The fact that the stone lies freely moveable in a dilated duct is always realised by the surgeon in the operation of choledochotomy, for it is difficult to fix the stone, owing to the ease with which it slips away from the grasp of the fingers.

The symptoms of stone in the common duct are sometimes trivial and inconspicuous and, indeed, are at times entirely absent. I have twice found during the performance of cholecystotomy that stones were present in the common duct when symptoms were wholly lacking. If the stone is small or fits loosely in the duct, there may be neither obstruction nor cholangitis, and the stone, therefore, may never attract clinical recognition. The symptoms are due in part to the intermittent mechanical impediment in the duct and in part to the cholangitis which the stones excite.

Pain is present only at times. It comes, as a rule, in attacks which vary much in severity. The pain is dull and aching with, especially in the beginning of the attack, spasmodic outbursts. As a rule the pain is accompanied by a rigor; the temperature runs rapidly up to 102°, 103°, or 104° F.; there are shivering and collapse, followed by sweating, and in the succeeding hours it is noticed that the jaundice, which is persis-

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tent, has deepened much in tinge. In the intervals between such attacks as these the patient suffers little or not at all. There is neither pain nor tenderness over the liver and the jaundice grows gradually paler. Jaundice, which was described by Courvoisier as the "cardinal symptom" of common duct obstruction, never disappears, though in very old-standing cases the patients may say that they are free from jaundice when there is still an obvious tinge of yellow in the conjunctivæ and in the skin. In one patient, a woman, who had suffered from these ague-like paroxysms for nine years, the skin was said to be "sallow" normally, and the suggestion that she was jaundiced to a slight degree met with no confirmation. It was only after the removal of one large and several smaller stones from the common duct that the patient became convinced, as her skin gradually whitened, that the sallowness was due to jaundice, from which she had never been free through all the nine years. Many patients noticed that the jaundice varies during the course of the day, being lighter in the morning and becoming deeper towards night.

The temperature angle in a case of common duct obstruction by a stone is quite characteristic. With each attack of pain there is a rapid elevation of temperature when the rigor occurs. As the rigor passes off the

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temperature remains until the next seizure of pain occurs, when the temperature mounts to 103° or 104° , to fall again at once. This rapid elevation and sudden fall of the temperature in each "attack" when the temperature is normal in the intervals causes the chart of a case of this kind to be perfectly characteristic. I suggested for it some time ago a name which seems quite appropriate and which has been since widely adopted—the name "steeple chart."

Courvoisier, in his analysis of recorded cases, found fever in 25 per cent. of the cases of occlusion from stone and in only 10 per cent. of the cases of occlusion due to other causes. The former estimate seems to me to be considerably below the truth. If a case of common-duct obstruction be observed for a period of two or three weeks, there will, with few exceptions, be found some abrupt elevation of temperature coinciding with the pain, and attacks of shivering and subsequent sweating, not perhaps of sufficient gravity to be considered as rigors, will occur. During an attack, and for some hours after, there may be a slight enlargement of the liver and the liver everywhere is tender to the touch. In chronic obstruction of the common duct the liver is always enlarged in the earlier stages; its increase in size may indeed be considerable. The liver may reach to the umbilicus or even descend beyond it. In each

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attack, when a rigor and an elevation of temperature followed by a deepening of the jaundice occur, an increase in the size of the liver may be observed, and the organ on handling is found to be tender. In the latter stages the liver decreases slowly in size and at the last may be even smaller than the normal. According to Mongour, the shrinkage of the liver is the most important sign of the degeneration of the hepatic cells. The condition of the stools and of the urine varies from time to time. As a rule, some bile passes always into the intestine, so that the motions are a deep buff in colour. After an attack there is obvious evidence, both in the fæces and in the urine, that less bile is getting access to the duodenum. The variations are, however, much more readily recognised in the stools than in the urine. The persistent presence of urobilin in the urine is held by many observers to indicate the onset and the continuance of a process damaging to the hepatic cells. In many cases an enlargement of the spleen is noticed, more especially after an attack and for some days subsequently. The gastric disturbances noticed in cases of gall-stone impaction vary within very wide limits. There may be nothing more than a sense of uneasiness in the epigastrium and distension after food, for which there is often a distaste, or, on the other hand, there may be severe vomiting during,

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and subsequent to, the attack and a feeling of profound nausea. Itching of the skin is almost constant, as in all forms of jaundice, and a crop of boils may at times break out.

One of the most marked and characteristic symptoms of obstruction of the common duct by stone is loss of weight. A loss of two, three, or four stones is not infrequently recorded. The loss is both rapid and considerable, and after a successful operation is very speedily regained. This loss of weight was ascribed by Fenger to "intermittent, frequent, ptomaine intoxication—that is, bile absorption—as well as to disturbed digestion." It is most important that this symptom should be recognised as a frequent and striking manifestation of stone in the common duct, for the haggard, wasted, often emaciated, appearance of the patient may strongly suggest a diagnosis of malignant disease. It is more than likely that some measure of responsibility for this symptom may rest with the pancreas, the secretion of which may be profoundly modified both in quality and in quantity by an extension of the inflammation from the common duct to the canal of Wirsung into the substance of the pancreas. Chronic pancreatitis is by no means an uncommon event in longstanding obstruction of the common duct, wherever the obstruction may be.

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The characteristic signs and symptoms of stone in the common duct, therefore, are:

Jaundice.—The jaundice is persistent but variable. It never wholly disappears, though in the interval between the attacks of pain may be so slight as to be almost unnoticeable. The colour becomes deeper after each attack of pain and gradually fades away in the intervals. In some patients a variation in the depth of tinge is noticed in the course of the day. When the jaundice deepens, there is an increase in the amount of bile in the urine and a diminution in the amount in the stools. The jaundice in common-duct obstruction may be said to “ebb and flow.”

Pain.—Pain may be constant and slight, but is liable to characteristic exacerbations. In the attacks the pain comes on suddenly, rapidly attains a maximum, when it is colicky in character, and then perhaps quite suddenly it disappears. Pain may radiate across the epigastrium and be associated with attacks, so called, of “indigestion.”

Fever.—The elevations of temperature are characteristic, and give rise when recorded to a “steeple chart.” There is a sudden elevation at the time of the onset of pain; there are a rigor, shivering followed by sweating, and a speedy return of the temperature to the normal, where it remains until the next attack. The paroxysms

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of pain, fever, and jaundice are ague-like in character and may occur with remarkable regularity.

During and after an attack there are tenderness and enlargement of the liver and probably also of the spleen. Itching of the skin is always present, and at times is the most distressing feature in the case, rendering rest and sleep impossible. The cause of the attacks is probably to be found in a renewed attempt on the part of the duct to expel the stone. From the dilated portion of the duct the stone is made to enter the narrower portion below, and a spasmodic muscular contraction is set up. In this way fresh damage is done to the duct, tension is increased, infection occurs, a cholangitis or an increase of an inflammatory condition already in existence takes place, and the mucosa throughout the ducts swells and narrows the lumen. The obstruction, in fact, becomes for the time mechanically complete, and partly for this reason, and partly because of the renewed attack of cholangitis, the jaundice deepens.

In the most severe forms of infection suppuration may arise in the duct. It is certain that infection is present in all cases attended by the symptoms just enumerated; it is equally certain that the infection rarely gives rise to suppuration. When a stone is removed from the common duct, even when jaundice

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is marked and long enduring, it is in my experience very rare to find pus in the ducts, however severe the clinical manifestations may have been. Some authors—Kehr and others—talk of foetid pus as being not uncommonly found behind a stone in the common duct. In my experience it is almost unknown. A suppurative cholangitis, therefore, is a rare complication of impacted stone. It is also a most serious—often, indeed, a lethal—one. The suppuration may extend not only along the whole length of the common duct, but also may involve the cystic duct and the gall-bladder (giving rise to empyema) and the hepatic ducts. In some cases an abscess or abscesses may develop in the liver by direct extension of the infection along the ducts, giving rise to the condition known as biliary abscess.

A gall-stone may remain in the common duct for years. In one of my patients the symptoms had been present for nine years, and a case of seventeen years' duration is recorded by Körte. One of the consequences of so long-enduring an inflammation in the duct is that the head of the pancreas may be involved by infection of Wirsung's duct or, perhaps, by direct or by lymphatic infection. Chronic pancreatitis, as was pointed out by Riedel, is a not infrequent complication of gall-stones impacted in the common duct. Opie has shown that in all probability many cases of acute

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pancreatitis are due to the impaction of a stone of small size in the ampulla of Vater, the result being that the common duct and the duct of Wirsung are converted into a single channel; retrojection of bile along the duct of the pancreas then occurs. In such a case the symptoms come on with marked suddenness. They are epigastric pain and tenderness, followed by distension, vomiting, and collapse. The diagnosis most often made is one of intestinal obstruction. In acute pancreatitis with fat necrosis there is no increased leucocytosis; in acute infective cholangitis there is a marked leucocytosis. There are many other causes, in addition to calculus, which set up inflammatory changes in the duct, but a consideration of these, though of great interest and importance, must be omitted here.

3. STRICTURE OF THE COMMON DUCT.

This may be congenital or acquired; the former condition would seem to be the more frequent.

(a) *Congenital stenosis* of the common duct is a part of the disease which has been described as "congenital obliteration of the bile-ducts." It is probable that, as Rolleston has suggested, the disease is primarily started during foetal life "by poisons derived from the mother and conveyed to the liver of the foetus, and that a

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mixed cirrhosis and cholangitis are set up." The result on the ducts is that an obliterative cicatricial process is started. The stenosis is perhaps found more commonly at the lower end of the common duct than elsewhere. Above the narrowed part the duct may dilate and form a cyst. In one case, the specimen of which is in the Museum of Guy's Hospital, three and a half pints of bile were aspirated from the cyst, and Oxley⁵ records a case of a cyst containing 36 ounces of bile occurring in a child six weeks old.

The existence of this congenital obliteration or stenosis of the ducts in foetal life and in early infancy is now well recognised. It is not so generally known that a condition, probably the same, certainly closely allied to it, is found in young adults. In them jaundice may first appear at any time between the ages of ten and twenty-five; the jaundice gradually deepens, there is no pain, nor are there, as a rule, any rigors or other evidences of infection. A tumour, cystic in character, may be recognised below the costal margin on the right side. On opening the abdomen a stricture of the common duct, generally near its lower end, has been found, and cholecystenterostomy, or choledochenterostomy, or choledochotomy with drainage have been performed. An admirable history of such a case is given by Swain.⁶ Other cases are recorded by Ashby,⁷ by Körte,⁸ by

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Konitzky,⁹ by Seyffert,¹⁰ and by Rostowzew.¹¹ In none of these cases was there any history of cholelithiasis. The stenosis came on insidiously and was probably the result of a continuation into adult life of a process begun in early infancy or in foetal life. There would be an analogy then in the condition found in the pylorus described as "congenital, hypertrophic stenosis," which is believed to have a definite relationship with a similar condition which first attracts attention in young adults. Most of the cases proved fatal after operation. A successful operation for the similar condition is recorded by Treves.¹² The patient, aged nineteen years, had been jaundiced since the age of three years. At the operation the lower end of the common bile-duct was found to be obliterated or absent. Cholecystenterostomy proved successful.

(b) *Acquired Stenosis of the Common Duct.*—Acquired stricture of the common duct results, as a rule, from the healing of an ulcer which has been caused by the pressure or the constant fretting of a stone. In other cases the cause may be an ulceration due to typhoid fever, or possibly to syphilis. A stone which has been long delayed in the duct may pass onwards into the duodenum, and a stricture then slowly develops. As a rule, a stone is found in the strictured duct above the obstruction. Hoffman, Merbach, Wyeth, and others

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have described a similar condition in the hepatic duct; in the cystic duct it is seen quite commonly. Pye-Smith¹³ has described a case of cicatricial contraction of the common duct in a woman aged twenty-six years; a small stone lay immediately above the stricture. Johnson¹⁴ records a remarkable case of stricture of the upper part of the common duct in a woman aged thirty-eight years. The symptoms, after being present for over a year, disappeared, to return a year later shortly before her death. Phillips¹⁵ records a case of "cartilaginous" stricture in the common duct. In neither of these cases were gall-stones found. Körte¹⁶ records the case of a man, forty years of age, who had suffered for five months from jaundice, rigors, and remittent fever. On opening the abdomen the gall-bladder was found to be dilated and stones were present in the cystic duct. The hepatic and common ducts were dilated. The common duct was opened and found to contain a stone behind a very narrow stricture. The stricture was excised and an end-to-end anastomosis was made between the cut ends. A drainage-tube was placed in the hepatic duct and cholecystenterostomy was performed. The patient died on the twelfth day from hæmorrhage from an ulcer on the lesser curvature of the stomach; a large vessel was found eroded. Pennato¹⁷ gives notes of one case of stenosis of the

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common duct near its termination, due to fibrous inflammatory thickening. There was an enormous distension of all the ducts behind the obstruction.

I have operated upon one case of this kind. The patient was a man, aged sixty-three years, who had the typical symptoms of a stone in the common duct, and who had suffered from his disease for nearly four years. I found the upper part of the common duct greatly dilated, at least $1\frac{1}{2}$ inches in diameter. In the dilated portion a small stone and much black sand were found. The common duct at the junction of its first and second portions rapidly narrowed like a wine-glass to its stem. I performed a plastic operation upon the duct and drained the hepatic duct. For nine weeks bile was discharged from a fistula, but at the end of that time the wound became dry and the patient has since (for over nine months) been perfectly well.

A cicatricial contraction in a duodenal ulcer may cause a narrowing of the duct. I have met with only one such case. The scar in the duodenum felt like a stone fixed in the ampulla. I opened the duodenum to remove the stone, when a hard cicatricial nodule was found. There was no suspicion as to its malignancy. I therefore united the wound in the bowel to the gall-bladder (cholecystenterostomy), affording a complete relief to the symptoms. The patient remains well

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four and a half years after the operation. A case of excision of a simple stricture of the common duct is recorded by Kehr. In one case, in addition to that mentioned above, Körte excised a stricture of the common duct which he supposed was cicatricial. On microscopic examination it was found that the condition was carcinomatous. There can be no doubt that a stricture which, to the naked eye, appears merely fibrous may be undoubtedly carcinomatous; cases in support of this statement are related by Krokiewicz, Körte, and others.

4. CARCINOMA OF THE COMMON BILE-DUCT.

Cancer of the bile-ducts is rare; the common duct is affected far more frequently than the hepatic or cystic ducts. It is not improbable that the disease is more common than the records seem to show, for the resemblance in certain cases to a simple fibroid thickening of the duct is very close. It is well known that in a very large proportion of cases of carcinoma of the gall-bladder the condition is associated with, and its onset determined by, gall-stones. The dependence of cancer of the common bile-duct upon the prolonged irritation of stones is far less clear. In 40 cases collected by Devic and Gallavardin¹⁸ gall-stones were found nine times—three times in the duct and six

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times in the gall-bladder. Rolleston in 80 cases found that gall-stones were referred to in 62 cases; in 23 it was noted that they were present, in 39 that they were absent. The growth may affect any portion of the duct, but though there is no point of predilection, the ends of the duct seem to be more commonly attacked than the central portion. In 57 cases mentioned by Rolleston the upper end, the junction of hepatic, cystic, and common ducts, was affected 25 times, the middle part 11, and the lower end 21 times.

The growth appears in two characteristic forms, which may be described as the *projecting* and the *infiltrating*. In the first it is small in size and projects as a firm, white nodule into the lumen of the duct. When during an operation the duct is gripped between the fingers, the impression that the lump is a calculus is very strong. The projecting mass may undergo ulceration and bleeding be caused thereby. In the second form the growth infiltrates the duct, converting it for a part, or for the whole, of its length into a rigid, thickened tube. The stricture thus formed, especially when localised, may readily be mistaken for a cicatricial mass, the result of the healing of an ulcer. The infiltrating form is seen more commonly at the upper end of the duct, the growth spreading upwards into the cystic and hepatic ducts. The growth, as a rule, is

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small, but Brenner records an instance in which the tumour formed was as large as a hen's egg, and Rolleston one of the size of an orange. The growth does not spread easily to surrounding parts, a few glands may be enlarged, and deposits at times are seen in the liver, but metastases rarely occur. In a very few cases the growth is palpable on examination of the abdomen. Behind the growth, of either form, all the ducts are dilated; this is a constant feature. The gall-bladder is dilated also. Devic and Gallavardin in 18 cases of growth in the common duct found the gall-bladder distended in 17, and in 14 cases of cancer at the confluence of the three ducts 7 times. In one-half the cases the gall-bladder is easily palpable.

The growth begins insidiously and increases steadily. The symptom to which it first gives rise is jaundice, which begins almost imperceptibly, deepens by the slowest degrees, and never recedes. As the colour deepens less bile is noticed in the stools and bile appears in the urine. There is progressive, unceasing emaciation, week by week strength is lost, and the body-weight decreases. In all recorded cases the very striking cachectic appearance of the patient is mentioned. Ascites may rarely appear from pressure upon, or involvement of, the portal vein. Splenic enlargement is infrequent. In some cases the conditions may be com-

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plicated by the presence of a stone in the duct. The symptoms then are anomalous. In only one recorded case, that of Stokes, has there been intermittent fever. Death may be due to gradual exhaustion, to hæmorrhage, to rupture of the gall-bladder, or to the onset of an acute infection in the duct.

Treatment.—Carcinoma of the common duct is generally unsuspected. Only one case, so far as I am aware, has been positively diagnosed. The treatment that is necessary will depend upon the position and extent of the growth. If the growth be limited, of the “projecting” type, the part of the duct in which it lies should be removed. A cylinder, one inch or more, must be cut away, and if enlarged glands are found, they also must be removed. After the removal of the growth an end-to-end approximation may be made, if need be, when the duodenum has been “mobilised” after the method of Kocher. Drainage should be provided for, the circular suture being incomplete at one part where a tube is introduced. If end-to-end anastomosis cannot be performed, the distal end of the severed duct may be closed by ligature and the proximal end anastomosed with the duodenum. Or both ends may be closed and cholecystenterostomy performed.

If the growth be extensive, of the “infiltrating” type,

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resection of the duct may still be possible, but suture of the divided ends, then so far separated, is out of the question. Ligature of the ends and cholecystenterostomy may be performed. If the growth is irremovable, a palliative operation—cholecystenterostomy—may give relief to the most urgent and most troublesome symptom—jaundice.

Dr. W. J. Mayo¹⁹ makes some very practical remarks upon cases of operative defect of the common bile-duct. He records two cases in which growths were removed from the common duct—in one end-to-end anastomosis was performed and in the other choledocho-duodenostomy—and two cases in which a part of the duct was removed together with the cystic duct and the gall-bladder. Brenner reports²⁰ two cases operated upon by Jordan, of Heidelberg. In both the cancer was unrecognised at the operation; both patients died and the condition of cancer of the duct was discovered post mortem. Kehr records one case of choledochectomy for cancer. I have only once had to deal with cancer of the common duct by operation. The growth involved the common hepatic, cystic, and common bile-ducts. The growth with the gall-bladder was removed and the distal end of the common duct, rendered mobile by freeing the duodenum, was sutured

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to the proximal cut end of the hepatic duct and drainage was instituted.

5. PRESSURE UPON THE DUCT FROM WITHOUT.

There are numerous conditions which cause blocking of the common duct by compressing it from the outside or by causing kinking. These conditions are: (*a*) chronic inflammatory enlargement of the head of the pancreas; (*b*) tumours of the pancreas (cysts, carcinoma, calculus); (*c*) ulcer or carcinoma of the stomach or duodenum; (*d*) peritonitis which results in adhesions around the duct; (*e*) enlargements of the lymphatic glands along the duct due to tubercle, lymphadenoma, or carcinoma; (*f*) stone in the cystic duct, causing compression of the duct; (*g*) tumours growing from the kidney, adrenals, retroperitoneal tissues, or elsewhere; (*h*) aneurysms of the larger vessels, aorta, superior mesenteric, hepatic; and (*i*) hepatoptosis, or nephroptosis causing kinking of the duct. The mere enumeration of these conditions is sufficient to show that any detailed consideration of them would carry one far beyond the scope of this paper. Most of the conditions cause an interference with the common duct only as a matter of secondary significance, and they do not call, therefore, for any surgical interference with the duct itself.

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OPERATIONS UPON THE COMMON DUCT.

The operations practised upon the common duct are: (1) choledochotomy; (2) choledochostomy; (3) choledochectomy; (4) choledochoplasty; and (5) choledochenterostomy. In all operations upon the common duct it will be found of great advantage to place a sandbag under the patient's back, behind the liver, to make a free opening into the abdomen by Bevan's incision, or by Mayo Robson's incision (a curtailed Bevan's incision), and, if possible, to lift up the lower edge of the right lobe of the liver, to turn it upwards and outwards through the incision, and in this way to put the ducts on the stretch and to bring them near to the surface. As soon as the abdomen has been opened and the exact condition of things discovered, gauze swabs must be packed in the wound to cover and to protect all the parts in the immediate neighbourhood of the operation area. A large swab is passed backwards into the upper part of the kidney pouch, a second downwards towards the pelvis on to the transverse colon, and a third inwards to the middle line over the gastro-hepatic omentum. Over these large swabs smaller ones are placed which are changed from time to time as they are soiled. The larger ones remain throughout the operation.

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1. *Choledochotomy*.—The common duct may be opened in its first, second, or third portion.

(a) *In its first portion* the duct is exposed by freeing the adhesions around it and rotating the liver in the manner already described. The stone is then located and is gripped between the finger and thumb of the left hand. With the stone so held a suture is introduced into the duct on each side of it, the needle being passed into the lumen of the duct and picking up the duct walls at two or three points. The stone acts the part of a “darning ball” (the ball thrust into a stocking that is being darned), making the introduction of the needle easy. The two sutures are of catgut and are left long. The duct is held up by traction upon them and incised on to the stone. The edges of the duct may be seized then with long fine vulsellum forceps. The stone is extracted and any other stones that are easily felt are taken away also. The finger is then passed into the duct, an additional glove-finger being put on. The finger should be passed upwards to the bifurcation of the hepatic duct and downwards to the ampulla. It is with the finger alone that calculi can be detected; a spoon or a probe is quite useless. When all the stones are abstracted pieces of gauze are passed into the duct and will bring away with them some fine sand. If there is much thick, muddy sand in the duct it may be

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necessary to wash it out with saline solution introduced by a syringe which gives good pressure. During all these manipulations care must be taken to prevent the soiling of parts by the constant packing with, and changing of, the swabs. When the duct is clear, it may be closed with a suture or may be drained. If the gall-bladder is healthy and the cystic duct patent, the duct should be closed by a continuous suture. The removal of the gall-bladder if the cystic duct is patent is, in my opinion, most inadvisable in cases of stone in the common duct. The two stitches, which have been already introduced as retractors, are tied, the upper ends and the lower ends of one to the corresponding ends of the other; after tightening the ends are left long till a continuous suture is passed over them. The gall-bladder is then opened and drained.

In many cases of common duct stone the gall-bladder is small, shrunken, and buried in adhesions. It is useless, therefore, for purposes of drainage. In such circumstances a tube must be introduced into the common duct and passed upwards to the hepatic duct. When so introduced it is fixed by a single catgut stitch and the wound in the duct is closed up to the tube by one or two interrupted sutures of catgut; the gall-bladder, if the patient's condition permits, should then be removed. In many cases I have removed the gall-

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bladder first and then have slit up the stump of the cystic duct into the common duct at its origin, where a tube is introduced after the removal of the stones. In either case, whether the duct is directly drained or not, a split rubber tube is passed down by the side of the duct and beyond it into the upper part of the kidney pouch.

The operation of choledochotomy in a simple case where the gall-bladder, though containing stones, is reasonably healthy and adhesions are few and easily separable, offers no difficulties whatever and can be completed within half an hour. But in many cases adhesions are numerous, of old standing, and therefore tough, and in some cases fistulous tracks may exist between the gall-bladder and the duodenum or the colon. The conditions in the gall-bladder may have undergone what Mr. J. Rutherford Morison aptly calls the "natural cure," the stones may be securely isolated in the gall-bladder or embedded in the liver, and the cystic duct may be closed. A patient with such a condition has suffered perhaps for a great many years. She is therefore old and not improbably is feeble in health. If a stone in the common duct be causing urgent symptoms, its removal alone may be as much as the patient can bear. The "cured" condition of things in the gall-bladder must then be ignored, for to

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deal with them would involve the performance of cholecystectomy, partial hepatectomy, or the closing of fistulous openings in the bowel. If the stone in the common duct is removed and the duct cleared of sand or other stones and drained, the patient, after recovery from the operation, suffers no further troubles.

It is for such cases—for cases where, owing to the patient's age or general condition or to the local conditions present, nothing more than the common duct operation is possible—that I have adopted the method I have elsewhere described as “rotation of the common duct.” By this method the adhesions are ignored and the stone is yet easily removed. As soon as the condition of things is seen the left hand of the surgeon is passed transversely inwards in front of the pylorus and above the stomach, along the gastro-hepatic omentum. When the hand is well placed, the thumb is passed downwards to the common duct, so that the gall-bladder remnant buried in adhesions then lies in the cleft between the thumb and first finger and the tip of the thumb is against the stone. The hand is now rotated, the fingers are flexed, and the hand and wrists are bent over to the patient's left. The stone in the duct is thus brought well up into the wound and is easily seen. Behind and around it swabs are placed, a stitch, or two stitches, introduced, the duct is incised,

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the stone is removed, a tube is placed in, fixed with a stitch, and the operation is complete. Rotation of the duct avoids the necessity of the free separation of adhesions and converts what might be an exceedingly formidable and prolonged operation into a simple, speedy, and therefore far safer one.

There are cases in which when the stone or stones have been removed from the duct an immovable one is felt in the ampulla. This must then be removed through the duodenum in the manner to be mentioned presently. The wound in the duct may well be left open until the ampulla is incised, and a piece of gauze passed from the one opening to the other will bring away with it much fine sand.

(b) *In its Second Portion (Retro-duodenal Choledochotomy).*—The retro-duodenal portion of the duct may be reached from behind by a procedure similar to that employed by Kocher in the “mobilising of the duodenum” as a preliminary to the performance of gastro-duodenostomy. This method was suggested at the German Surgical Congress in 1898 by Haasler. It had been found necessary three times in 18 operations for stone in the common duct. Oscar Bloch, of Copenhagen, has described a similar operation to this. In the very great majority of cases a stone which appears to be fixed in this portion of the duct can be moved

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upwards into the first portion. The operation is therefore very rarely necessary.

(c) *In its Third Portion (Trans-duodenal Choledochotomy).*—When the duodenum is opened, the calculus may be found in the lower part of the duct or in the ampulla. If in the latter, the ampulla is incised and the stone is extracted (McBurney's operation); if in the former, the posterior wall of the duodenum over the duct is incised (Kocher's operation). The earlier steps in both methods are the same. The duodenum is exposed, and if deeply placed or not easily accessible, it may be freed by a vertical incision in the peritoneum to its right side. The stone is fixed by grasping it between the thumb and the fingers of the left hand. The duodenum is then opened by a vertical incision about one inch or a little more in length. The edges of this incision are grasped with fine vulsella and held apart. The greatest care is taken to prevent any leakage from the duodenum. The fluid therein is mopped up at once by swabs which are instantly discarded. As soon as the duodenum is well opened the stone is readily felt or, if in the ampulla, may be seen. If in the ampulla, the edges of the opening are enlarged and the stone is taken away. If in the duct, the walls of the duodenum are incised over the stone or the duct is slit up on a director passed into the ampullary orifice

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and the stone dislodged. In both cases a further search for other stones is necessary, the finger being passed upwards into the duct, which readily admits it. If the duct has had to be divided freely, the incision may be closed by suture or the opening left patent, the operation being then known as choledochoduodenostomy.

2. *Choledochostomy* is performed when the common duct is dilated so as to form a cyst. In most cases the swelling has been mistaken for the gall-bladder. (For records of cases see "Gallstones and Their Surgical Treatment," second edition, pp. 418 *et seq.*)

3. *Choledochectomy* is performed in cases of malignant disease or when in the removal of the stone the duct has been torn across. Cases are recorded by Doyen, Mayo, and myself. The ends of the duct may be approximated, or the distal end closed, and the proximal implanted into the duodenum, or both ends may be closed and cholecystenterostomy performed, or the defect in the duct may be repaired by a flap taken from the stomach.

4. *Choledochoplasty*.—I have once performed a plastic operation upon the common duct in a case of simple stricture of the duct, slitting the duct up longitudinally and stitching it transversely; an opening was left for drainage. The result has been very good. Kehr has

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repaired a defect in the common duct by turning a seromuscular flap upwards from the stomach.

5. *Choledcho-enterostomy* is performed when there is an impermeable stricture of the common duct which is greatly dilated behind the obstruction. A number of cases have been recorded since Riedel first performed the operation in 1888. Kocher's method of choledcho-duodenostomy between the third portion of the duct and the second portion of the duodenum has already been mentioned.

In cases where the common duct is drained it is desirable to keep in the tubes for at least a fortnight. An examination of a post-mortem specimen of common duct obstruction by stone will show the evidences of cholangitis which may extend upwards to the minute ducts in the liver. To give time for these ducts to rid themselves of infection is important. It is my custom in all these cases to administer urotropine to the patient immediately after the operation and for a few days before it if opportunity permits. In a case which I published in "The Lancet"²¹ the excretion of urotropine in the bile was proved by the rapid disappearance of typhoid organisms which were present therein when this drug was administered in ten-grain doses thrice daily.

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The Operative Treatment of Obstructive Jaundice and the Proper Selection of Cases.*

INTRODUCTION TO A DISCUSSION IN THE SECTION OF SURGERY AT
THE ANNUAL MEETING OF THE BRITISH MEDICAL
ASSOCIATION, BELFAST, JULY, 1909.

IN the proper selection of cases of obstructive jaundice for surgical treatment, the surgeon may find his capacity for accurate diagnosis taxed to the very utmost. It is true that there are certain types of case easily to be recognised, about which hardly any doubt or difference of opinion can be entertained, but it is also true that there are elusive cases in which no refinement of clinical acumen, nor any subtile investigation of the chemical changes occurring in the body, will enable a confident diagnosis to be made. Such cases cannot be too closely examined, nor too strictly debated, and a discussion such as this will doubtless help to throw light upon a difficult, interesting, and important problem.

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DIAGNOSIS.

In endeavouring to arrive at an accurate diagnosis in a case of obstructive jaundice, and therefore at a proper selection of those cases for which surgical treatment is necessary, three separate branches of enquiry must be followed. These are concerned with: (1) The clinical history; (2) the physical signs; (3) the chemical investigation of the urine and fæces.

1. *The Clinical History.*—I am inclined to think that a close enquiry into the most intimate details of the clinical history will afford the most substantial help. The exact details of the mode of onset of the jaundice must be ascertained. In some cases the onset is most insidious; the slight tinge of sallowness in the skin is not at first recognised as being due to a faint jaundice, and the earliest discovery of the patient's condition is made, not by himself but by another, who comments upon his altered appearance. It is then noticed that by slow degrees the jaundice deepens. There is neither haste nor pause in the process, and to the patient, and to those who see him constantly, the change may seem imperceptible from day to day. The progression is never checked, nor is there at any time a temporary lessening of the colour. The change is slow, and is always from a lighter to a deeper tinge. Finally

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a jaundice which the older physicians described as "black" may be seen; the colour is intensely deep and is dark green, rather than yellow or "black." The deep green tinge of the skin, together with the amber colour of the conjunctivæ, makes the appearance of the shrunken features of the patient very striking. In a patient whose jaundice has so progressed, the constitutional symptoms are significant. A period of general weakness, ill health, and emaciation may have preceded, and will certainly have accompanied, the jaundice. There is rarely any pain, usually indeed the patient denies the experience of any discomfort. He complains chiefly of a general languor, increasing feebleness and loss of flesh, distaste for food; and as the bodily health and vigour decrease, so the jaundice deepens.

In another and very dissimilar class of cases the jaundice will appear abruptly; and is then preceded, with the rarest exceptions, by an acute, often agonising, attack of pain. Within a few hours of the cessation of the agony, and before the stiffness and soreness which it leaves behind have passed away, the skin may be everywhere tinged with yellow, the urine is dark, and in a day or two the motions are pale and clay-coloured. The jaundice rapidly deepens, and may then gradually subside, and in a few days may pass completely away.

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Or it may be otherwise: the jaundice may deepen at first rapidly, and then may seem to attain its maximum, and remain stationary for a period that varies from a few days to a few months. At the end of this period something occurs—it may be a rigor, or a repetition of an attack of pain of the same character as the original seizure, or both may occur together. Soon it is clear that the jaundice is perceptibly deeper, but within a few days it begins to lessen, and may seem almost to clear away. But soon another attack of pain occurs, often accompanied or preceded by a rigor or a sensation of chill, the temperature rises rapidly, and presently the jaundice begins to deepen. This sequence of events is repeated sometimes with the most exact regularity, but usually with apparent caprice. The jaundice may at last become very slight indeed, and I have known it to be so constant and sustained a feature of the case that the recollection of the patient, and of the relatives, of the original natural colour of the skin has long been forgotten. When, however, an operation has removed the obstructive causes of the jaundice it is seen that what has been so long called sallowness is really a discolouration of the skin by bile. In such a case the orderly repetition of the rigor, with the accompanying abrupt elevation of the temperature, may lead to a diagnosis of malarial fever.

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The foregoing represent the two chief types of obstructive jaundice, the one beginning insidiously without pain, and going on unchecked to the deepest tinge—the “black jaundice” of the older writers—the other beginning abruptly, and then following upon an acute and agonising attack of pain, deepening for a time, but at length yielding, only to increase again and again, it may be, upon the recurrence of acute seizures of epigastric pain. The former type appears commonly in those who have before suffered little or no abdominal trouble, who have been free from all “indigestion,” and in robust health to the moment of the onset of jaundice, and who then rapidly waste and lose all interest in, or capacity for, their ordinary daily tasks. The latter type appears always in those who have suffered long from flatulence, indigestion, colic, and all the characteristic “inaugural symptoms” of gall-stones.

The conditions which may cause the first type of jaundice, due to a progressive, unremitting, and finally complete obstruction of the duct, are:

1. Carcinoma of the pancreas.
2. Carcinoma of the common hepatic, cystic, and common ducts.
3. Carcinoma of the ampulla.
4. Stricture of the common hepatic or common bile-ducts.

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5. Stricture of the ampulla due to the cicatrix of a duodenal ulcer.

6. Compression of the common duct from without—for example, by the scar of a duodenal ulcer, by a large stone in the cystic duct, by enlarged glands in the portal fissure or below it; rarely by carcinoma of the stomach or duodenum.

The conditions which may cause the second type of jaundice, due to an obstruction, at first perhaps complete, but soon becoming incomplete and variable, are:

1. Stone in the common hepatic or common bile-duct.
2. Chronic pancreatitis, with or without stone.
3. Hydatid cysts in the common duct.
4. Pressure from without, as in renal and other tumours.

2. *Physical Signs.*—(a) In these two types of case the condition of the gall-bladder affords a sign helpful in differential diagnosis. In the former class the gall-bladder is dilated; in the latter, contracted. The recognition of this fact we owe to Courvoisier. "Courvoisier's law," as it is called, asserts that "in cases of chronic jaundice, due to blocking of the common duct, a contraction of the gall-bladder signifies that the obstruction is due to stone; a dilatation of the gall-bladder, that the obstruction is due to causes other than stone." Violations of this law, as of all clinical laws, are found,

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but an extended enquiry revealed less than 10 per cent. of error. The errors, moreover, are not so significant as this statement would lead one to suppose; for, as a rule, enquiry into the other conditions of the case makes the diagnosis clear. The infractions of the law are found in the following circumstances:

1. Where there is a stone or a stricture in the cystic duct causing hydrops or empyæma, together with the acute impaction of a stone in the common duct.

2. Where there is a stone in the cystic duct pressing upon the common duct.

3. Where there is distension of the gall-bladder by an acute inflammatory process, with obstruction of the common duct by stone.

4. Where there is chronic induration of the head of the pancreas, with a stone in the common duct.

5. Where there is malignant disease of the common duct at any part of its course, or cancer of the head of the pancreas, and a chronic sclerosing cholecystitis.

(b) The presence of an ovoid or oblong abdominal tumour in the lower epigastric region, or at the junction of the epigastric and right hypogastric areas, is significant of an enlargement of the pancreas. This enlargement may be due to a malignant growth in the pancreas, the swelling then being hard, a little irregular and painless; or it may be due to a chronic inflam-

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matory deposit in the gland, the swelling then being rather softer and decidedly more painful. It is rare, decidedly, for a malignant tumour in the head of the pancreas to be felt on examination; it is not very infrequent, especially in thin people, for an inflamed and enlarged pancreas to be palpable.

(c) Enlargement of the liver is generally noticed in cases of biliary stasis. When the obstruction is intermittent, as in calculous impaction, the variations in the size and in the tenderness of the liver may easily be recognised. After an acute seizure of pain the jaundice deepens, and the liver becomes larger, more easily palpable—swollen in fact; and it is decidedly more tender. Irregular bosses on the surface of the organ are strongly indicative of carcinoma.

(d) The presence of free fluid in the abdomen is very suggestive of malignant disease. In the late stages of cancer of the head of the pancreas, ascites with œdema of the lower limbs is rarely absent. But ascites which is due to pressure upon the portal vein may result from the impaction of a stone of large size in the cystic or common ducts. In “Gall-Stones and Their Surgical Treatment” (second edition, p. 211) I have recorded a case in which a large stone, fixed in the cystic duct, had so compressed the portal vein and the common bile-duct as to cause jaundice and ascites, for which

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the patient was several times tapped in the belief that malignant disease of the pancreas or liver was present.

3. *Examination of the Urine and Fæces.*—The work of Cammidge on the condition of the urine and fæces in cases of obstructive jaundice and of pancreatic disease has, I feel sure, given us great assistance in arriving at a correct diagnosis in those difficult cases where the ordinary clinical signs leave one in great perplexity and doubt. In the case just quoted, for example, an examination of the urine would have shown the absence of pancreatic disease, and the fæces would probably have contained some small quantity of stercobilin. The characteristic needle-shaped crystals can be obtained from the urine when treated by Cammidge's method in cases of pancreatitis, acute or chronic. In cases of malignant disease they are found only in about one-fourth of the cases, and in these a zone of inflammation probably surrounds the cancerous area. If the obstruction to the common duct is above the pancreas, and is complete, no bile will pass into the intestine, the stercobilin reaction will therefore be absent from the fæces, and all the pancreatic juice will pass into the bowel. The digestion of food will therefore be unaffected. A deficiency of pancreatic juice is shown by the fact that the fat-splitting process is being inadequately performed, and that consequently a large part

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of the fat, even more than 90 per cent., may be discharged unabsorbed. If all the bile passes into the bowel and the pancreatic juice is prevented from doing so, the stools, as Claude Bernard and Walker have shown, are colourless, probably because of the large amount of undigested fat which they contain. No better example of the value of Cammidge's methods could be found than in the record of the following case:

J. D., male, aged fifty. Complains of jaundice of great intensity. Until nearly the end of July was quite well; at that time began to suffer from flatulence and distension after food. Pain never acute or colicky; no vomiting. Occasionally periods of relief for a few days, but the attacks continued to return until six weeks ago, when he became jaundiced. Since then pain has been absent, but jaundice has gradually deepened. There has been no pyrexia, no rigors, nor does he think the jaundice has lessened in intensity. Has lost 2 st. in weight.

State on Examination.—The liver is felt to be enlarged, and is smooth and regular. The gall-bladder can be indistinctly felt; it does not project far beyond the liver border. Just above the umbilicus an indistinct mass was felt on one occasion which suggested an enlarged pancreas.

The Urine and Fæces (Report by Dr. Helen G. Stewart).—A well-marked pancreatic reaction in the urine points to some degree of chronic pancreatitis, which is confirmed by examination of fæces. There is a high percentage of total fats, of which nearly half are combined fatty acids, indicating that although the pancreas is affected, occlusion of the pancreatic duct is not complete, and the obstruction to the common bile-duct must be above its junction with the pancreatic. That obstruction of the common duct is almost complete is shown by the presence of only a trace of stercobilin in the fæces; but the absence of

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undigested matter in the fæces also supports the conclusion that the primary site of the disease is in the common bile-duct and not in the pancreas.

Diagnosis.—The case was diagnosed as one of obstruction of the common bile-duct at a point above the bile papilla from some other cause than carcinoma of the pancreas.

Operation, October 13, 1908.—The liver was enlarged and gall-bladder much distended, with thickened walls, although it did not project beyond the lesser margin for more than a short distance. Common duct dilated as far as upper margin of duodenum. There was an indurated scar in the duodenal wall which involved the duct and compressed it to complete obstruction. The scar was adherent to and seemed to involve the adjacent part (only) of the head of the pancreas. No tumour of the head of the pancreas. No calculi palpable. Gall-bladder aspirated and found to contain clear mucus only. It was decided to perform a cholecystenterostomy. The duodenum could not be brought up to the gall-bladder without dangerous tension, and so the anastomosis was made between the gall-bladder and transverse colon. Wound closed.

The patient was sent by Dr. Dunderdale (Blackpool), who reports in March, 1909: "He is somewhat sallow, his appetite is good, and he has gained 2 st. since the operation. Between December 28, 1908, and January 5, 1909, had three attacks of colicky pain over the gall-bladder region, followed by elevation of temperature and jaundice lasting three or four days. He now appears to be quite free from all his former inconvenience. The urine contains no bile. The pancreatic reaction has almost disappeared."

SELECTION OF CASES FOR OPERATION.

The selection of the cases suitable to operation depends exclusively upon the accuracy with which a

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diagnosis can be made. The conditions most commonly met with are carcinoma of the pancreas, chronic pancreatitis, and gall-stones impacted in the common ducts.

In carcinoma of the head of the pancreas the first type of jaundice with insidious onset, and finally becoming absolute, is characteristic. The gall-bladder is constantly palpable, petechial hæmorrhages or even large subcutaneous effusions of blood occur, and rapid and severe wasting, loss of appetite and all energy, and anæmia are constant features. The pulse, as a rule, is slow; the itching of the skin intolerable; ascites with œdema of the legs and abdomen comes at the last. When the urine is examined, the "pancreatic" reaction indicative of an inflammatory change is absent in the great majority of cases; in the minority it is found, and in them it is probably always the case that, in addition to the carcinomatous deposit, an inflammatory condition in the parts of the gland immediately adjacent has recently developed. The fæces very rarely show any evidence of stercobilin. This is due to the fact that it is not usual for a case to be submitted for examination in the early stages, when the compression of the common duct is slight. In the later stages, when no drop of bile can pass through into the intestine, the stercobilin reaction cannot of course be obtained. In

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cases of incomplete obstruction of the duct by a stone, the presence of stercobilin, though possibly in very small quantities, is constant.

Chronic pancreatitis is, of course, most often found in association with cholelithiasis, and usually with, or sequent upon, the presence of a stone in the common duct. It is now well known that the effect—chronic inflammation of the pancreas—may long survive the cause—a gall-stone; but it is not so generally recognised that the inflammation of the gland may progress insidiously even though the irritant which initiated it has been removed. So, finally, the pancreas is sclerosed, and diabetes may result. The recognition of the presence of gall-stones at an early stage and their removal is, therefore, the surest means of preventing the development of chronic inflammation of the pancreas. There are clinically two types of chronic pancreatitis; in the first the symptoms and signs approximate to those of carcinoma of the pancreas; in the second, to those of intermittent calculous obstruction of the duct. In the former the jaundice is sometimes very deep, but is rarely complete or unremitting. The tinge may vary in depth, even during the course of a single day, or may ebb and flow so slightly as just to be recognised. The gall-bladder is then distended by bile, not by mucus. The fæces are abundant, frequent,

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soft, and greyish-white in colour, and greasy in appearance by reason of the great excess of neutral fat which is undigested and unabsorbed. Stercobilin is present and the urine gives the Cammidge reaction. The duration of the disease and the absence of the extreme cachexia help to distinguish the simple from the cancerous condition.

In the second form there are the varying jaundice, the occasional rigors and sweating, the rapid elevations and depressions of temperature which characterise a case of chronic obstruction of the common bile-duct; but all these things seem rather less in degree. Pain is not severe, and is rather a sense of epigastric oppression and uneasiness than an acute agonising colic.

In cases of acute calculous obstruction of the common bile-duct a difficulty of differentiation from carcinoma of the pancreas may well be experienced, for the jaundice is deep and progressive in both. The history, however, gives the surest clue. With few exceptions, pain is absent in carcinoma, and is present in high degree before the onset of jaundice due to a stone. In the former the jaundice appears insidiously, in the latter rapidly. A stone does not lie long in the duct, however, before secondary changes appear; the duct dilates, and the stone comes to fit loosely. Then appear the signs so characteristic of the "floating"

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stone—attacks of severe epigastric pain of a colicky character, rigors, “steeple” elevations of temperature, and the rapid transient deepening of a jaundice which never entirely clears away. The gall-bladder is contracted as a result of many old attacks of cholecystitis, and is therefore never, or very rarely, palpable. Wasting is often extreme; in one of my cases there was a loss of 12 st. in weight—from 22 st. to 10 st. Within six months of operation 7 st. of this loss were recovered. The liver is almost always enlarged, and is especially so immediately after an attack of pain. It is smooth, and there are no irregularities upon its surface. In the intervals of the attacks of pain the patient often feels well and may gain a little in weight; constipation is usually present at all times. A point upon which stress has been laid as distinguishing gall-stone impaction from chronic pancreatitis is that in the former the radiating pain is to the right, in the latter to the left. I have not found that any reliance can be placed upon this.

When carcinoma affects the hepatic or common bile-ducts, or the ampulla of Vater, the symptoms strongly resemble those due to cancer of the head of the pancreas.

There is, however, a possibility of making an accurate diagnosis by giving attention to the history, and

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by making use of Cammidge's methods. The history points more frequently to gall-stone disease; in carcinoma of the pancreas, as I have seen it, a history of cholelithiasis is very rare, nor are stones found in the ducts or in the gall-bladder at operation or autopsy. In cancer of the larger bile-ducts stones are found, though by no means so frequently as in cancer of the gall-bladder. Rolleston found stones present in 23 out of 62 cases of primary carcinoma of the bile-ducts. In both cancer of the pancreas and cancer of the common bile-duct the gall-bladder is usually distended. Devic and Gallavardin in 18 cases of primary carcinoma of the common duct found that the gall-bladder was enlarged in 17. The examination of the urine and fæces should enable a diagnosis to be made if the growth in the ducts is above the papilla, for the canal of Wirsung is then free, and the pancreatic juice can flow unimpeded into the intestine. The "pancreatic reaction" is negative; no stercobilin is present.

Simple stricture of the common hepatic duct or common bile-duct may result from the healing of an ulcer due to a gall-stone, as in a case of my own, or it may occur independently of gall-stones as a sequence to typhoid or other infection. In my case, a diagnosis of obstruction of the duct, due possibly to stricture

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following an old calculous obstruction, was made upon the history alone.¹

OPERATIVE PROCEDURE.

The operations practised for obstructive jaundice are concerned either with the direct removal of the impediment, or with the making of an alternative path for the bile, or in certain cases with prolonged drainage of the bladder and ducts.

The following are the procedures:

(A) *Removal of the Obstruction*.—(a) Choledochotomy; (b) Choledochectomy; (c) Choledochoplasty.

(B) *Short-circuiting Operations*.—(a) Cholecystenterostomy; (b) Hepatico-duodenostomy; (c) Cystico-duodenostomy; (d) Choledochoduodenostomy; (e) Hepato-cholangio-duodenostomy.

(C) *Drainage Operations*.—(a) Cholecystostomy; (b) Choledochostomy.

In cases of prolonged jaundice a tendency to hæmorrhage has been noticed. Petechial hæmorrhages, or even large effusions of blood beneath the skin, may occur. During an operation every smallest vessel may ooze continuously, and after the wound has been closed bleeding may go on quietly between the stitches, or hæmorrhage may occur within the abdomen near to, or at some distance from, the parietal incision. There

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are those who believe that the hæmorrhage is more likely to occur, and is of more significance if the pancreas is involved, but I have not been convinced that there is evidence for this belief. In some cases of prolonged biliary obstruction the coagulation time of the blood may be lengthened, but this is not often or even usually the case, and I have known it to be shortened.* But of the tendency to hæmorrhage in a few cases, whatever the coagulation time may be, there can be no doubt. And the question at once arises as to whether anything can be done to forestall or counteract this. A. E. Wright suggested many years ago that calcium chloride would increase the coagulability of the blood, and Mayo Robson and others have consistently advocated the use of the salt, and have quoted cases in which they believed it to have been of value. My own view is that no good comes of its use; the evidence seems insufficient. It is well known that the coagulation of the blood in any species is greatly accelerated by the injection of an alien serum, and upon this fact I have based the practice of injecting sterilized horse serum (diphtheria antitoxin will do in an emer-

* An important point in differential diagnosis is, I think, coming from this work. A coagulation time of eight or nine minutes or more is rarely found in simple cases and is common in malignant conditions. When other signs and symptoms leave the differential diagnosis in doubt, this may give conclusive help.

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gency) before operation upon jaundiced patients. It may be coincidental, but it is true, that since doing so hæmorrhage has not occurred in any case of mine (the effect of the serum was marked in the case of a "bleeder" who had had two teeth extracted and had bled almost to death). J. C. Munro² has administered fresh rabbit serum in doses of 30 c.c. subcutaneously twenty-four hours before operation in fifteen or twenty patients, some of whom were purpuric, without seeing "the least tendency to oozing except in one or two instances, when it was checked at once by the use of more serum." Further experience of the use of these alien serum injections is necessary before their real worth can be estimated; but, so far as I have been able to see, I think that they are the most reliable of all methods.

1. *Operations Concerned with the Removal of the Obstruction.*—These are now, as a rule, easily performed, and the results, both immediate and remote, are very satisfactory. The position of the patient, the back being arched over a cushion placed behind the liver, and the upward and outward displacement of the right lobe of the liver make the approach to the common duct very much easier. The bile in the common duct is usually infected; in more than half the cases a culture of an organism can be obtained; it is therefore

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necessary to protect all parts within the abdomen and the abdominal wall also from infection. The duct may be exposed by the free separation of all adhesions around and about it, or, if the patient's condition be very poor, by the method of "rotation of the duct" which I have described elsewhere. The duct being opened and to all appearance cleared of obstruction, the finger must be introduced to explore the interior, for in no other way can it be made certain that all stones have been removed. The duct should always be drained by a tube which passes upwards to the hepatic duct; it is never prudent to attempt its complete closure by suture. The gall-bladder also may be drained; it is never wise to remove it in these cases unless it is useless or diseased beyond power of recovery. The results of choledochotomy followed by drainage are most satisfactory. The mortality is now about 5 per cent., and the after-history is almost always free from incident. I have only once had to operate a second time on a patient whose common duct had been opened and drained, by myself, for calculous obstruction.

2. *Short-circuiting Operations.*—In malignant disease of the head of the pancreas, for example, short-circuiting operations are hardly justifiable in the average case. Every aspect of the case is unfavourable. The

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patient is ill, wasted, extremely feeble; his blood condition is bad, and the tendency to hæmorrhage is remarkable; the relief obtained by operation, of whatever kind, is slight, and does not justify the desperate risk.

The one distressing symptom which urges the patient to cry for relief is itching of the skin. This is an intolerable torment. To give some ease to it by any outward application is, I believe, almost impossible. The surgeon may therefore be persuaded to attempt relief by cholecystostomy or by cholecystenterostomy. The former operation I have several times done under eucaine or novocain anæsthesia. The gall-bladder is large, and the operation rapid and easy. The relief occasionally is considerable, though it may be many days before bile begins to flow freely, the functions of the liver have been so long suppressed. Cholecystenterostomy for these cases is a dangerous operation; its mortality would appear to be near to 75 per cent.—almost prohibitive. But if the disease is recognised early, and the patient's condition be otherwise favourable for operation, a rare case for surgical treatment may be encountered. The relief then (in no more than three cases of my own) is great, and the awful distress, inevitable if jaundice develops deeply, may be entirely avoided. Some faint tinge of yellowness,

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however, remains in the skin, but the itching, even when felt, is never unbearable.

The operation of cholecystenterostomy finds its most suitable application in cases where the obstruction of the duct is considerable, likely to be permanent, and is of a non-malignant character. Chronic pancreatitis is certainly the disease most often needing this relief. But here a word of warning is needed. The range and the rôle of chronic pancreatitis must not be unduly enlarged. It is a very real disease, but it is not to be diagnosed in any rough and haphazard manner. I have known cases in which large stones were present in the lower part of the common duct treated by a short-circuiting operation, the concomitant enlargement and induration of the head of the pancreas being then attributed to chronic inflammation. A very sufficient examination of the common duct is necessary before the presence of stones can be excluded, and a preliminary examination of the urine and fæces must have been made in most cases before a diagnosis of pancreatitis can be confidently established. In the great majority of instances chronic pancreatitis is almost a negligible complication of cholelithiasis. The treatment of the gall-bladder or of the ducts will then suffice to relieve the lesion in the pancreas, which is secondary. The drainage for two or three weeks of the bile-passages

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is all that is needed. But there are cases in which long after the stones have passed the pancreatic inflammation endures, and in such cases an anastomosis between the gall-bladder, which is often distended, and the duodenum may alone be competent to give relief. In my own work I look upon the need for cholecystenterostomy as very restricted, partly because the great majority of cases are equally well treated by less serious means, partly because I am doubtful of the permanence of the drainage by a short circuit in the absence of complete obstruction, and partly because I do not feel sure that in some cases an escape of organisms from the intestine to the bile-passages may not occur. This last objection is, of course, reduced to the smallest proportion if the duodenum is selected for the anastomosis; unhappily this is not always possible, the jejunum or even the colon being sometimes more accessible. The operation is one, therefore, of restricted use; it finds its surest application in the obstructions which are complete and permanent, and it is most aptly applied when the duodenum is accessible for the anastomosis.

The operations by which the main bile-channels are anastomosed to the intestine (hepatico-duodenostomy, cystico-duodenostomy, and choledocho-duodenostomy) are rarely necessary. They are performed either after the removal of a stricture (simple or malignant) of the

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ducts or when operation defects are present. Dr. W. J. Mayo has demonstrated the best methods of their performance and the chief indication for their employment.

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On the Violation of Courvoisier's Law.*

THE differential diagnosis in cases of obstructive jaundice may be difficult, and is sometimes impossible. In order to increase our chances of accurate diagnosis to the fullest extent, the closest attention must be paid to every separate symptom and to every different grouping of the individual symptoms. The most important clinical aid to diagnosis is that which is now generally known as "Courvoisier's law." The facts upon which this law is based were first collected by Courvoisier, and are given in detail by him in his monumental work.¹

Recently the "law" has been associated with the name of Terrier; and is referred to as "Terrier's law," or "the Courvoisier-Terrier Law," but the French surgeon has not the least claim to priority in this matter; the credit of the work accomplished is to be given to Courvoisier alone. Terrier himself, indeed, acknowledges that the first enunciation and demonstration of the law were due to Courvoisier.²

* Reprinted from the *Edinburgh Medical Journal*, May, 1906.

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The details given by Courvoisier upon which the law is based are as follows:

Up to the time when his review of the literature was made, there were recorded 187 cases of obstruction of the common duct from all causes. Of these, 100 were due to obstruction from causes other than stone, and 87 were due to obstruction by stone. Of 100 cases in which the obstruction was due to causes other than stone, in 92 cases there was dilatation of the gall-bladder; in 8 cases there was a normal gall-bladder, or an atrophy of the gall-bladder. Of 87 cases in which the obstruction was due to stone, in 70 cases the gall-bladder was small and atrophied; in 17 cases the gall-bladder was dilated.

All these cases were collected from post-mortem records. Of the cases that had been submitted to operation, 35 in number, in 18 the obstruction was due to causes other than stone, and in 16 of these there was dilatation of the gall-bladder; in 17 the obstruction was due to stone, and in 13 of these the gall-bladder was contracted.

These facts were summarised by Courvoisier and may be embodied as a "law" in the following statement:

"In cases of chronic jaundice due to obstruction of the common bile-duct, a contraction of the gall-bladder

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signifies that the obstruction is due to stone; a dilatation of the gall-bladder, that the obstruction is due to causes other than stone."

Independent confirmation of this law was made by Terrier and by Mayo Robson; subsequent writers, without exception, have corroborated it, and have quoted exemplary instances of its accuracy.

Ecklin, in 172 cases of common duct obstruction due to calculus, found that 28, or 16 per cent., had dilatation of the gall-bladder; 144, or 84 per cent., had contraction of the gall-bladder. In 139 cases of obstruction due to other causes, 121, or 87 per cent., had dilatation of the gall-bladder.

A further examination of the question has been made by Dr. A. Cabot, of Boston, who collected the records of the Massachusetts Hospital for a series of years. There were 86 cases of obstruction of the common duct. Of these, 57 were due to obstruction by stone; in 47 the gall-bladder was atrophied, in 8 it was normal, and in 2 enlarged. Twenty-nine cases were due to causes other than stone; in 27 the gall-bladder was distended; in one the gall-bladder was empty, and in one contracted around three stones. Only 4 cases, therefore, in this series did not fall in with Courvoisier's law. Cabot writes: "With the exception of these four cases, which constitute only 5 per cent. of the total number exam-

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ined, every record of the Massachusetts Hospital series, in which definite statements are to be found concerning the points at issue, goes to confirm Courvoisier's law."

The explanation given originally by Courvoisier of the occurrence of the sclerosis of the gall-bladder in cases of calculous obstruction of the duct was, that stones had been present in the gall-bladder for long periods, that their presence there had caused recurring attacks of cholecystitis, and that, as a result, the gall-bladder walls had become thickened and fibrous. The gall-bladder, so affected, became by degrees more and more shrunken, and at the last was represented by a shrivelled mass of fibrous tissue, its cavity was greatly reduced in size, or almost obliterated, and the surrounding dense adhesions hid it from sight. Oft-repeated attacks of cholecystitis and peritonitis resulted in the cicatricial compression and cramping of the gall-bladder. Distension of such a gall-bladder is, of course, mechanically impossible.

Fenger, criticising this statement, offers the explanation that "the atrophy in these cases, hitherto incomprehensible, is easily explained by the ball-valve action of a floating choledochus stone at the distal end of the cystic duct." This, however, leaves out of consideration the numerous cases where the stone is not found at the spot mentioned. Elsewhere Fenger attri-

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butes the emptiness of the gall-bladder to a floating stone "in or near the cystic duct."

The great probability is that the explanation of Courvoisier is entirely correct. The sclerosis (it is not merely an "atrophy," as Fenger says) of the gall-bladder is a matter of old standing, and is present long before the impaction of the stone. Fenger's explanation would account for the emptiness of the gall-bladder in a few cases, but not for the cicatricial contraction present in the great majority.

In cases of obstruction of the common duct, when the jaundice is persistent and unvarying, when it does not "ebb and flow," a dilatation of the gall-bladder very strongly suggests a diagnosis of malignant disease, probably in the head of the pancreas, but possibly in the common bile-duct itself. But the association of chronic jaundice and enlargement of the gall-bladder does not always mean that cancer is present or that stone is absent. The "law" may be infringed, sometimes flagrantly, as Courvoisier himself was the first to assert.

In the great majority of the cases that have come under my own observation, Courvoisier's law has proved to be correct. Some of these cases have been submitted to operation, and the diagnosis verified in that way, but many of them, after the opinion has been

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expressed that malignant disease was present, have been deliberately left without operation; the subsequent clinical course and post-mortem examination have shown that the diagnosis was accurate.

To achieve an accurate diagnosis in cases of chronic obstructive jaundice is of the first importance, for if the disease is simple, an operation will cure the patient; if the disease is malignant, the operation in itself is productive of great harm, and no possible benefit can be expected from it. But little attention has been given to the conditions which are disclosed when there is an infraction of Courvoisier's law. Several cases have come under my own care in which chronic jaundice and distension of the gall-bladder have been associated, in the absence of malignant disease, and at least two in which cancer of the head of the pancreas was found at operation, and subsequently verified by microscopic examination when no distension of the gall-bladder was present. In one case I have operated for carcinoma of the common bile-duct, the gall-bladder being sclerosed.

Courvoisier calls attention (p. 59) to several cases in which hydrops or empyema of the gall-bladder due to stone in the cystic duct, or to stenosis of the duct, was present when there was calculous obstruction of the common duct.

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The following are brief extracts from the notes of some cases under my care in which there was a transgression of Courvoisier's "law:"

Group 1.—Cases of chronic obstructive jaundice associated with distension of the gall-bladder, in the absence of malignant disease.

CASE 1.—*Empyema of the gall-bladder due to impaction of a stone in the cystic duct; obstructive jaundice due to stone in the common duct.*—The patient was a woman, aged fifty-eight, who for many years had suffered from attacks of "spasms," which, since her child-bearing period, had been very much less severe than they were previously. In April, 1904, there were a series of attacks of severe pain in the right hypochondrium, two of which were followed by transient jaundice. In September, 1904, she became deeply jaundiced, and from that time up to April, 1905, the jaundice had varied very little from time to time. Ten days before her admission to the Infirmary in April, 1905, she had a rigor, a temperature of 104.2°, and a swelling was then first noticed in the abdomen.

On admission the patient was deeply jaundiced. Her temperature varied between 98° and 100° in the morning, and between 100° and 102° at night. During seven days when she was under observation, the jaundice did not vary in the least. There was pain in the right hypochondrium, and on examination a large ovoid mass could be felt. It was smooth and tender, and was recognised as a distended gall-bladder. On the ninth day after admission a rigor occurred; the abdomen became full and tender. Operation was undertaken, an empyema of the gall-bladder found, due to a stone impacted in the cystic duct. In the third part of the common duct a stone as large as a pigeon's egg was felt. It was pushed backwards in the first part of the duct and removed. The gall-bladder was drained, the stone in the cystic duct being easily dislodged. The patient recovered.

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CASE 2.—*Hydrops of the gall-bladder; obstructive jaundice due to many stones impacted in the common duct.*—A lady, aged forty-eight, had suffered from jaundice for fifteen months. The jaundice had come on without pain, and had not varied after the first month. After nine months of jaundice the opinion was expressed by a distinguished physician that there was malignant disease of the pancreas, for examination disclosed a distended gall-bladder. A fortnight before I saw her in January, 1906, there had been a sharp attack of pain in the upper part of the abdomen, followed by a temperature of 102°. The jaundice did not vary.

There had been in this case, therefore, jaundice of fifteen months' duration, no variation in the depth of colour, and evident enlargement of the gall-bladder. The duration of the disease and the absence of pronounced wasting prompted me to suggest that the common duct was probably full of stones, and the exploration, at least, was desirable. On opening the abdomen, I found an old hydrops of the gall-bladder, probably of longer standing than the jaundice, and a complete impaction of the common and hepatic ducts by calculi and sand. There were thirty-six large stones in the common duct, all consisting of bilirubin calcium, and the intervals between them were filled up with a thick, tenacious, black mortar. The unvarying nature of the jaundice was at once explained. There had been a most effective barrier of masonry in the duct, and no drop of bile had been able to pass it.

CASE 3.—*Stone in the cystic duct pressing upon the portal vein and the common bile-duct.*—Patient was a woman, aged fifty-nine. Her illness began suddenly six years ago with violent pain in right hypochondrium. The attack was one of typical gall-stone colic, and was followed by jaundice. She had another attack two years ago, and a third one year ago, but apparently was not jaundiced. Two months ago her abdomen began to swell, and she became jaundiced. One month ago she was tapped and 11 pints of dark fluid drawn off. On examination, there was marked jaundice with much ascites. The gall-bladder

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formed a mobile, rounded tumour, palpable opposite the tenth costal cartilage. Nine and a half pints of dark bilious fluid were drawn from the peritoneal cavity, but the abdomen rapidly refilled, and the patient died two days later.

Post-mortem.—Abdomen distended with about 6 pints of bloody fluid and clot. Gall-bladder sausage-shaped, $4\frac{1}{2}$ inches long and 2 inches broad, containing multitude of minute stones in clear mucus. Hepatic ducts markedly dilated. Half stone size of a medium-sized Barcelona nut. Common bile-duct dilated; contained a few minute stones. The stone in the cystic duct pressed against the common duct, almost occluding it, the duct being dilated above the point of pressure. The stone also pressed upon the portal vein, there being a few adhesions between the cystic duct and the peritoneum over the portal vein. Both the common duct and portal vein were patent to the passage of a probe.

Cases similar to the above are related by M'Arthur³ and Moore.

CASE 4.—Chronic pancreatitis; persistent jaundice; distension of the gall-bladder.—(The case now quoted is only one of several that I have seen illustrating the same points.) A lady, aged forty-five, had suffered for twenty years from biliary colic. Seven years ago she became jaundiced, and has never been free from it since, though the colour has varied from time to time. During the last twelve months the tinge has got steadily deeper, and an enlargement of the gall-bladder has been observed. There has been a loss of 2 stones in last three months. Operation, March, 1904. The distended gall-bladder, almost thrice its natural size, was full of black, muddy material and bile. The common duct was dilated; it contained no stone, but much gritty material similar to that in the gall-bladder; the head of the pancreas was very greatly enlarged. The gall-bladder was emptied and drained for five weeks. The contents of the common duct were milked backwards into the gall-bladder. In March, 1906, the patient wrote to say she was quite well.

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CASE 5.—*Deep jaundice; distension of the gall-bladder and bile-ducts by hydatid cysts.*—The patient, a woman, aged fifty-one, was admitted to the infirmary with a history of chronic unvarying jaundice, distension of the gall-bladder, and enlargement of the liver, of five months' duration. Within a few days death occurred from acute mania. The patient was almost moribund when admitted, and a diagnosis of malignant disease of the head of the pancreas was made; no operation was possible on account of the patient's desperate state. At the post-mortem, a large hydatid cyst was found in the right lobe of the liver; it communicated with the gall-bladder. The gall-bladder, cystic and common ducts were as full as they could possibly be of small, grape-like hydatid cysts.

Group 2.—Cases of chronic obstructive jaundice, without distension of the gall-bladder, due to malignant disease.

CASE 6.—Mrs. A., aged fifty-seven, seen February, 1905. For several years there had been attacks of "spasms"; the last attack was more than five years ago. In several of the attacks there was jaundice: on one occasion jaundice persisted for five months, during which she had many attacks of shivering and pain. After an exceptionally bad attack, she obtained relief from the jaundice, which had never returned until eleven weeks before I saw her. The present attack commenced gradually, with slight pain in the upper part of the abdomen. The jaundice gradually deepened, until the skin became a dark yellowish-green in colour. Wasting was rapid and extreme; in eleven weeks she had become very emaciated. There was occasionally a slight elevation of temperature; no rigors occurred, and the jaundice never lessened. The liver was slightly enlarged and readily palpable; the gall-bladder could not be felt, but there was tenderness along the lower border of the liver. This was the history I obtained when I saw her in February, 1905. I

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expressed an opinion that there was probably malignant disease in the common bile-duct or in the head of the pancreas, and that the absence of distension of the gall-bladder was due to the old attacks of cholecystitis. Three days after I first saw her a rigor occurred, followed within a week by a second one. This seemed to make exploration desirable. On opening the abdomen, I found and removed a mass of cancer at the beginning of the common duct. The gall-bladder was shrivelled, and its contracted cavity contained a little muddy mucous fluid. The patient died in a few hours.

This is the type of case in which one would expect to find a violation of Courvoisier's law. For it is probable that in cases of carcinoma of the common bile-duct, as in carcinoma of the gall-bladder, the development of the malignant change is secondary to prolonged gall-stone irritation. The inflammatory conditions set up by the gall-stones in the gall-bladder result in its conversion into a shapeless mass of fibrous tissue, incapable of distension.

CASE 7.—*Chronic obstructive jaundice due to malignant disease of the head of the pancreas; no distension of the gall-bladder.*—The patient was a man, aged seventy-three, who had suffered from stomach trouble "all his life." He was a querulous neurotic individual. Three and a half months before I saw him he had become jaundiced, gradually and painlessly. Wasting soon became pronounced, and vomiting almost continuous. There was no fullness of the gall-bladder. A mass was palpable just above the umbilicus and a little to the right; the stomach was dilated, and waves of contraction were seen to pass constantly over it. The patient had been seized a few hours before I saw him with acute pain and collapse. A diagnosis of perfora-

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tion of a malignant growth in the stomach was made, and I saw him to advise upon the question of operative treatment, and expressed a decided opinion against any such measure. The patient died a few hours after I saw him. At the post-mortem a large internal hæmorrhage was found, the origin of which could not be discovered. There was malignant disease of the head of the pancreas. The gall-bladder was free from adhesions or obvious disease, and was of normal size.

Other illustrative cases could be quoted, but evidence enough has been adduced to show that Courvoisier's law, like all other laws, is capable of infraction.

The following may be stated as the chief circumstances in which the law may be violated:

1. Where there is a stone or a stricture in the cystic duct causing hydrops or empyema, together with the acute impaction of a stone in the common duct.
2. Where there is a stone in the cystic duct pressing upon the common duct.
3. Where there is distension of the gall-bladder by an acute inflammatory process, with obstruction of the common duct by stone.
4. Where there is chronic induration of the head of the pancreas, with a stone in the common duct.
5. Where there is malignant disease of the common duct at any part of its course, or cancer of the head of the pancreas, and a chronic sclerosing cholecystitis.

After making full allowance for all these conditions,

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it cannot be denied that the validity of the law is established in at least 90 per cent. of the cases met with in practice. In the remaining 10 per cent. there is rarely a difficulty in diagnosis when the other symptoms are passed in review.

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The Mimicry of Malignant Disease in the Large Intestine.*

WITHIN the last three years I have operated upon six cases of disease of the large intestine under the mistaken impression that I was dealing with examples of malignant disease. In all, the clinical manifestations and the macroscopic appearances supported my opinion, but minute examination of the specimens removed or the subsequent clinical history of the case has proved that, in all, the condition was of a non-malignant character.

It is well known that tubercular disease, especially when affecting the cæcum or the ascending colon, may produce symptoms and signs which are with difficulty distinguished from those due to cancer. I have twice performed colectomy for supposed carcinoma, removing the cæcum and a part of the ascending colon in one case, and the cæcum, ascending colon, and a part of the transverse colon in another, when an examination of the tumour removed displayed the undoubted evi-

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dences of tubercular disease. But such cases are not very uncommon, and it is not with them that I propose to deal in this paper.

It is not, however, so well recognised that tumours of the large intestine, of the sigmoid flexure more especially, may present all the characteristic signs and symptoms of malignant disease, and yet prove to be nothing more than simple inflammatory conditions. The six cases whose details are given differ in character very considerably; the one circumstance common to them all is the close resemblance, indeed, the identity, of the symptoms and signs with those of malignant disease. The following are the notes:

CASE 1.—A. C., aged twenty-eight, admitted into the Leeds General Infirmary on April 2, 1904, complaining of passing blood in the motions and of frequent and irregular action of the bowels.

History.—The present illness commenced three months ago. Her life has been medically uneventful save for pneumonia seven years ago. There was no history and no evidence either of syphilis or of tubercle. Aperients were occasionally necessary; otherwise the bowels were regular in their action until the present illness. Blood was first noticed in the stools in the early part of January, 1904. It rapidly increased in amount and the bowels acted five or six times a day, each motion containing more or less blood. As much as half a pint of mixed blood and mucus was passed at a time. In consequence she became very weak and had to take to bed. About two months ago she began to vomit frequently, almost all food being rejected. This subsided for a time, but recommenced a fortnight later

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and persisted irregularly up to admission. The passage of blood meanwhile continued and became rather worse. The bowels acted seven or eight times a day, the stools consisting principally of blood and mucus. Occasionally clots were passed. During the few weeks previous to admission she experienced a good deal of aching pain in the left iliac fossa, which continued to within a short time of her coming into the hospital.

On admission she was obviously much reduced and very weak and bloodless from the continued hæmorrhage. She vomited once or twice on the two days following admission. There was no complaint of pain, but the bowels acted from five to seven times a day, a considerable quantity of blood and some mucus being passed. The abdomen was distended and the intestine obviously obstructed.

On rectal examination the sphincter was lax; a soft, somewhat irregular mass was to be felt involving the whole of the rectal wall. Anteriorly it appeared to protrude somewhat, but elsewhere felt like thick moss growing on the wall of the intestine. Its upper limit could not be reached. The rectum from about two inches above the anus was narrowed to such a degree as to make the passage up of the finger very difficult. There was slight bleeding as a result of the examination.

A diagnosis of a rapidly growing carcinoma, with partial obstruction, was made, and on April 17, 1904, *inguinal colotomy* was performed. After the gut was opened the bowels acted at first very copiously, afterwards from one to three times a day. Some blood-stained discharge continued from the rectum, but this was less in quantity than before. Her general health improved considerably for a time. The discharge, however, began to increase and both blood and clots were passed. There was also considerable pain in the sacral region.

On June 16th she was readmitted after having been at home six weeks. The colotomy was then acting two to three times a day. With the fæces a little blood-stained mucus was passed. The rectal condition was apparently much the same as on the occasion of the previous examination. The patient was seen

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by Mr. Ward, under whose care she had been admitted, and resection of the growth was deemed advisable.

Operation.—On June 30, 1904, *proctectomy* was performed. The patient having been anæsthetised in the ordinary dorsal position, the colotomy opening was plugged with gauze. An incision was then made from it downwards and inwards for about 3 inches. The peritoneum having been divided, the sigmoid was withdrawn and divided between clamps about $\frac{3}{4}$ of an inch below the artificial anus. The lower end of the upper portion was then closed with a continuous suture of Pagenstecher thread. The upper end of the lower part of the sigmoid, having been sterilised by the cautery, was wrapped in gauze. The patient was now put up in the Trendelenburg position. Clamps were then applied to the meso-rectum close to the sacrum, and this fold was divided with the scissors close to the clamps. This proceeding was repeated lower and lower down until the whole of the upper part of the rectum, together with the meso-rectum and its contained glands, was freed. The peritoneum of the pelvic floor was then snipped through with scissors at the bottom of Douglas's pouch, and by means of the finger this opening was enlarged and the rectum down to the levator ani freed. The clamps having been ligatured off, the whole of the gut thus detached was wrapped in gauze and packed into the pelvis. The abdominal wound was then closed.

The patient was next placed in the prone position with the thighs flexed over the end of the table, the knees being supported on a stool. An incision was made in the middle line from the centre of the sacrum to the anus, bifurcating anteriorly to encircle that orifice. The last sacral vertebra and coccyx were removed and the lower part of the rectum dissected free, as in the usual operation of *proctectomy*. There was very little bleeding in this part of the operation, and the upper gauze-enwrapped part of the gut was soon reached and pulled down. The removal was completed by dissecting away the anal canal and orifice, the lower part of the gut not being opened. The pelvic floor was restored as far as possible with catgut sutures

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and the wound closed, large gauze drains being inserted, anteriorly and along the sacrum. The operation lasted nearly an hour and a half.

The patient stood the operation fairly well. The gauze in the colotomy opening was left in three or four days, but the abdominal wound was infected from it, and some superficial suppuration occurred. It was, however, completely healed within three weeks of the operation, as also was the sacral wound. Recovery was otherwise uneventful.

The patient is now (October, 1906) perfectly well. She has gained weight, so that she is now heavier than she has ever been, and her appearance is that of a healthy, well-nourished woman.

Description of the part removed.—The specimen after hardening in formalin measures 9 inches in length. The mucous membrane is greatly thickened, and its surface is raised up into prominent fleshy folds and convolutions. Over a part of the specimen there is a considerable degree of ulceration, which, by a process of undermining, has resulted in the formation of bridges and overhanging flaps and festoons of thickened mucous membrane. The thickness of the walls varies greatly, some of the tuberous projections of mucous membrane having a diameter of nearly $\frac{1}{2}$ an inch; these projections are separated from one another by branching sulci in such a manner as to give to the surface of the mucous membrane over the upper one-third of the specimen an appearance somewhat resembling the cerebral cortex. In the lower part of the specimen ulceration has reduced the thickness of the mucosa in places to 1 or 2 millimeters. The muscular coat averages about 2 millimeters in thickness, while external to this, in the lower part of the colon, is a layer of fat, $\frac{2}{3}$ of an inch thick. All the outer coats of the bowel are densely thickened and fibrous, and the lumen of the gut here is probably only about one-third of the normal. The inner surface of the bowel does not present any definite isolated tumour or polypoid growth, but there appears to be a general thickening of the mucosal rugæ, the tags of mucous membrane

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in the lower part of the specimen being detached at one extremity by ulceration.

Microscopic examination shows an overgrowth of the mucous glands. The glands are of irregular form and separated from one another by dense accumulations of lymphoid cells. Between the basis of the glands many smaller glands are seen cut in transverse section; these, as a rule, present a very small lumen. Sections through an ulcerated patch show much the same appearances about the bases of the gland where these are not disintegrated. Here there is more infiltration of the submucosa with round cells.

This condition is one quite unlike anything I have met with before. As far as I am aware no similar manifestations have been previously described, and the disease lacks a name. It is certainly not syphilitic, nor is it tuberculous. Of malignancy there is no suspicion. The only specimen in any degree resembling this that I have been able to discover in a search through the literature is figured by Koch.¹

CASE 2.—*Perforative sigmoiditis; localised abscess.*—Mrs. H., aged fifty-eight, seen in consultation with Dr. Norman Porritt, Huddersfield. The history was that the patient had always enjoyed exceptionally good health up to six years ago, when after eating some tinned chicken and ham she had ptomaine poisoning and was ill two months. Four years ago the patient had a severe illness, with much pain in the left iliac region. The doctor who attended her at that time told her she had “just escaped peritonitis.” In this attack she was confined to bed for six weeks. Since then she had suffered from time to time from attacks of pain in the left iliac region, many of which have kept her confined to bed for a few days.

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In November, 1904, what proved to be a severe illness began with acute pain across the abdomen; this was followed by constipation, sickness, and abdominal distension. In spite of treatment by enemata, etc., the condition of obstruction grew worse, and on December 4, 1904, I opened the abdomen. There was considerable distension of all the intestines, and peritonitis, with serous effusion. The seat of the trouble was found to be in the sigmoid flexure, a little above the brim of the pelvis. The bowel here for about 3 inches was thickened, swollen, and very hard. A perforation was found on the upper side, and a very copious deposit of lymph was plastered over and around this. The condition was thought to be one of malignant disease of the sigmoid flexure, with a perforation of a deep ulcer in the growth. A large tube was passed down to the open ulcer and the rest of the abdomen closed. The patient's condition, to my surprise, gradually improved; but on December 20, 1904, a deep-seated mass between the median incision and the left iliac crest was found. The patient's temperature rose and a second operation was performed, some pus being evacuated from an incision two inches to the left of the former one. The abscess cavity reached to the sigmoid flexure. The pus-collection was clearly the result of insufficient drainage at the time of the original operation. The subsequent progress was good.

Dr. Norman Porritt kindly saw the patient on October 1, 1906, and reported: "The patient did well and is now better than she has been for years. All the discomfort in the left iliac region which was more or less always present after the ptomaine poisoning has entirely left her, and the bowels, which never acted without medicine, are now spontaneously regular."

The condition in this case has become clearer to me since I operated upon one of the cases related below. I think there can be little doubt that there was a

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perforation of a false diverticulum of the sigmoid flexure.

The appearance and the consistence of the tumour of the sigmoid flexure were such that we felt no doubt that malignant disease was present. The tumour resembled in all particulars that which I removed from Case 5, recorded below.

CASE 3.—*Pericolitis transversa; colectomy*.—Mrs. W., aged fifty, was seen in consultation, with Dr. Carlton Oldfield and Dr. Greenwood in May, 1905. She had suffered for some months from occasional sickness and indigestion. During the few weeks preceding my examination of her she had noticed great irregularity of the bowels. Constipation had been most obstinate; when relieved by an aperient there was diarrhœa for twenty-four or forty-eight hours, followed again by constipation for several days. The patient was a very stout woman, but had lost nearly two stones in six months. On examining her abdomen a hard mass was felt situated to the left of the umbilicus. This mass was about four inches in diameter, and apparently adherent to the parietes. A diagnosis of a carcinoma of the transverse colon was made, and operation advised.

Operation (May 31, 1905).—On opening the abdomen the peritoneum was found to be indurated and gristly, about $\frac{1}{2}$ an inch in thickness. Involving the transverse colon and the adjacent omentum was a very hard, flat, irregular mass. The induration infiltrated the bowel and the omentum very widely. No enlarged glands were perceptible. No doubt whatever was felt by any of us that the mass was a malignant growth in the colon. The whole tumour, with about 5 inches of the transverse colon, was removed, and an end-to-end anastomosis performed.

When the intestine was laid open, it was found to be firmly embraced and not a little constricted by a densely hard "scirrhous"

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mass. The most careful examination of the mucosa revealed no surface defect; the membrane was everywhere smooth and supple; there was no ulceration and no diverticula could be discovered. Beneath the mucosa, which was freely movable on the deeper structures, was a wide infiltrating stratum of fibrous tissue which involved all the other coats of the intestine, and spread into the omentum.

Microscopically the mass surrounding the gut is seen to consist of dense fibrous tissue, containing here and there small aggregations of lymphocytes, particularly around the vessels. The mucous membrane is normal.

The origin of the inflammatory process in this case was not discovered. It would appear to have been an inflammation of the peritoneum surrounding the transverse colon, with an implication of the contiguous omentum. No affection of the appendices epiploicæ was found. A condition of things exactly similar to this is known to occur in the sigmoid flexure.²

CASE 4.—*Growth in rectum; proctectomy.*—Mrs. S., aged forty-one, seen with Dr. Waddington, Bradford. She gave a history of having suffered from diarrhœa for five months, small quantities of mucus at times tinged with blood being passed, sometimes as often as twenty times in a day. The rectum on examination was felt to be filled with a very soft, friable, ulcerating mass, fairly movable, though extensive.

On July 17, 1905, a preliminary inguinal colotomy was performed, and a month later the removal of the growth was undertaken. Eleven hours before the second operation 27 c.c. of a 2 per cent. solution of nucleic acid were injected subcutaneously. At the commencement of the operation, at 9 A. M., the temperature was 100.4° F., pulse 120. The pelvic colon and rectum down to within an inch or two of the anus was removed by the

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trans-sacral route, the upper portion of the pelvic colon being fixed in the upper angle of the wound. At 2 P. M. the temperature was 100° F., pulse 140; at 10 P. M. temperature 98.6° F., pulse 95.

Macroscopic appearance of specimen.—The specimen measures 14 inches in length and includes portions of the rectum and pelvic colon. The upper 8 inches of the bowel are normal, but below this the mucous membrane is covered with an exuberant cauliflower-like growth. At the junction of the healthy with the affected portion the mucous membrane is undermined; below this is a flattened area which appears to be superficially ulcerated; adherent to it in places are tags of villous growth. The lowest portion of the bowel, extending to within an inch of the bottom of the specimen, is occupied by a soft and friable, projecting, papillomatous mass which is extensively undermined, forming a kind of bridge over a portion of the bowel. The whole circumference of the intestine is involved for a length of about 4 inches. The obstruction to the bowel, partly by the exuberant growth, partly by a thick fibrous deposit in the wall of the intestine, is well marked.

Microscopic report.—Sections of the villous growth show delicate branching processes composed of a framework of fine connective tissue and covered with a single layer of tall columnar cells whose nuclei are larger and stand more irregularly at different levels than those of the cells covering the non-villous mucosa. Sections of the flattened areas of mucous membranes show the bases of the intestinal glands strictly limited by the muscularis mucosæ; but more superficially the cells are desquamating and lie in many places entangled in a mucoid substance around the broken-down gland mouths. The lymphatic glands examined contained no epithelial deposits. In the majority of the sections there is no evidence of malignancy, but in one place sections show irregularly massed epithelial cells extending deeply towards, but not invading, the muscular coat.

The clinical history, and the conditions found on

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examination, both justified a diagnosis of malignant disease in this case. Yet the condition is a simple one. There are multiple exuberant papillomatous growths undermined by ulceration, and a considerable thickening of the outer coat of the bowel due to a deposit of fibrous tissue has caused a moderate degree of stenosis.

CASE 5.—*False diverticula of sigmoid; sigmoiditis; colectomy.*
—Mr. A., aged fifty-two, seen with Dr. Helm, of Carlisle, April 2, 1906. He has suffered from stomach troubles for a long time, but dates his present illness from eighteen months ago. He has attacks of pain in the abdomen which come on at varying times after food, from half an hour to three or four hours. He also suffers from a sense of weight and distension in the stomach, and frequently vomits. He vomited blood on one occasion twelve months ago. The bowels are habitually constipated. During the last few months this has been a more serious inconvenience than before. On a few occasions, constipation has persisted for three to six days, and has given way only to persistent effort. On two occasions, five weeks ago and ten days ago, there was intestinal obstruction. The abdomen became greatly distended, obstruction was complete, and vomiting of intestinal contents occurred. The last attack was so serious that it was feared operation might have to be undertaken for a possible growth in the large intestine.

On his admission to the Nursing Home the stomach was found to be slightly dilated; no contractions were seen and no tumour felt. The gastric contents on admission to the Nursing Home showed the presence of free HCl and contained sarcinæ. After a twelve hours' fast the stomach contained some food residue, yeast, and sarcinæ, but no HCl or lactic acid. One hour after a test-meal HCl was present in excess. There was a moderate digestion-leucocytosis one hour after a meal.

Examination per rectum revealed nothing. The diagnosis

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was chronic duodenal ulcer with stenosis. A fear was entertained that there might also be a growth in the large intestine, though nothing could be felt.

At the operation, on April 4, 1906, an inflammatory mass was felt in the duodenum. It was hard and fibrous, of the size of a walnut; there was evident duodenal obstruction. The large intestine was then examined from the transverse colon, which was distended a little downwards. On reaching the ilio-pelvic colon, a hard mass was felt which was thought to be malignant. As this was deemed the more important condition, the duodenal ulcer was left untreated and a fresh incision made over the tumour, which was very adherent to neighbouring coils of small intestine and to the abdominal wall. The adhesions were separated and the tumour delivered into the wound. The affected part of the sigmoid flexure, in length about 5 inches, was excised and axial anastomosis performed. The patient recovered, convalescence being somewhat delayed by infection of the upper wound, which was sutured last. On October 14, 1906, the patient reported that he had "made very great progress." The following is the report upon the specimen:

"Macroscopic appearances.—The portion of the bowel removed is about 5 inches long; the walls are greatly thickened, making the unopened specimen appear to be involved in a growth. The external surface of the gut is reddened, lumpy, and in places flakes of lymph mark the site of recent adhesions to neighbouring coils of small intestine. On laying open the bowel, the mucosa shows no sign of growth or ulceration, though its lumen is slightly contracted by reason of the induration of the gut. This, in certain parts, is over $1\frac{1}{2}$ inches in thickness, the increase being due to inflammatory exudation beneath the peritoneum. When the mucous surface is examined more closely, numerous pockets or diverticula are seen, some of which might contain the tip of a No. 10 English catheter. On cutting sections of the bowel wall parallel with the long axis of the pockets these are found to be of variable depth, often twisted or slightly

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dilated at their blind extremities. The pouches are lined by thinned mucous membrane and have pushed the circular muscle layer before them. Around the tips of the deeper pockets the muscular coat has become atrophied, but is traceable as a well-defined, white, fibrous-looking layer continuous with the unaltered muscular coat elsewhere. The extremities of one or two pouches are surrounded by an area of inflammatory extravasation, though no perforation can be actually demonstrated.

“Microscopically.”—The pockets are lined by normal mucous membrane, though about the bases of the gland-cells, towards the apex of the pocket, there is an increased number of small round cells. Immediately beneath the glands lies the muscularis mucosæ; this can be clearly traced around the pouch. External to the muscularis mucosæ, and separated from it by some loose connective tissue, is the true muscular coat. If this be traced towards the extremity of the pouch, it is found to become thinned, its fibres being intermingled with fibrous tissue and interspersed with aggregations of lymphocytes. Outside this fibrous layer, which covers in the diverticulum, the wall of the gut is composed of loose connective tissue containing an inflammatory exudate becoming more cellular towards the peritoneal surface, beneath which are numerous extravasations of blood. The peritoneum itself is covered with a delicate layer of fibrinous lymph, in the meshes of which are entangled numerous lymphocytes.”*

False diverticula of the large intestine are of great pathological interest. Acquired diverticula are found in all parts of the intestine, from the duodenum to the

* Papers dealing with this subject have since been published by Dr. W. J. Mayo (Surg., Gynæc. and Obstetrics, 1907, v, 8) and Dr. Maxwell Telling (Lancet, 1908, i, 843). The latter contains the most complete account yet published. I have now had eight examples of this condition.

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rectum. In the small intestines, though numerous, their clinical significance is of the slightest, for the thin fluid contents of the bowel do not readily become pent up in these little pouches. Gordinnier and Sampson³ say that they have been unable to find a single case reported in the literature in which clinical symptoms have arisen from diverticula of the small intestine. In the large intestine the diverticula are not infrequently seen; the sigmoid displays them more frequently than other parts of the colon. The false diverticula are always multiple; they are hernial protrusions of the mucosa and submucosa along a track in the intestinal wall weakened by the passage of a vessel. Once developed, they are prone to become places for lodgment of the solid, slowly traveling intestinal contents. The various pathological conditions resulting from acquired diverticula are:

1. Chronic inflammatory deposit in the walls of the bowel, producing stenosis.
2. Localised peritonitis which may lead to the formation of pus.
3. General suppurative peritonitis, the result of perforation.
4. Vesico-intestinal fistulæ, due to rupture of a localised abscess into the bladder.

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5. Inflammation and thickening and contraction of the mesentery, in which the pouches lie (mesenteritis).

6. Carcinoma. Hochenegg has recorded the only case of cancer developing in a false diverticulum.

CASE 6.—*Tumour of transverse colon and splenic flexure; ileo-sigmoidostomy*.—Mrs. W. S., aged sixty-two, seen with Dr. Holderness, December, 1903. The patient has suffered for seven months from flatulence, colic, constipation, and loss of weight. During the last three months she has twice been confined to bed for periods of three and four days respectively in attacks of subacute intestinal obstruction. In the last of these I saw her, and on examination I found the abdomen distended; coils of small intestine were seen contracting, and the cæcum, ascending and transverse colon could be seen to distend and could be felt to harden. Loud rumbling noises were heard in the abdomen, and the patient told us that she had noticed these “bubbling” sounds for several weeks past. For the twenty-four hours before I saw her the patient had been very nauseated and had vomited twice. The general condition was good. Shortly after my visit the obstruction yielded to a gravitation enema, the bowels being copiously relieved on several occasions, and the abdomen becoming soft and flaccid again. A diagnosis of malignant stricture of the splenic flexure was made, and the patient came to a nursing home for operation. On her arrival there the abdomen was hollow, the wall relaxed, and a tumour could be distinctly felt in front of the left kidney. When grasped between the hands the mass felt of the size of a cocoanut.

Operation (December 14, 1903).—An incision was made in the left linea semilunaris and the abdomen was opened. The transverse colon was found to be thickened and red; the descending colon and sigmoid flexure were pallid and empty. A large, excessively adherent mass was seen and felt occupying the left end of the transverse colon. The mass was hard, smooth, but irregular in shape; it was adherent in all directions to the

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abdominal wall, the stomach, the diaphragm, and to a few coils of intestine. Resection was impossible, and I had to be content with a short-circuiting operation. I secured the lowest part of the ileum and united it to the sigmoid flexure (ileo-sigmoid-ostomy). The distal limb of the ileum was narrowed by infolding sutures of linen thread.

The recovery of the patient was uneventful. Since the operation she has gained weight steadily; the tumour has entirely disappeared; nothing can be felt in the region it once occupied so fully. The bowels act well, and the patient's appearances justify her written statement that she "never felt better."

In this case I had no suspicion but that the tumour was carcinoma in a stage so advanced as to render resection mechanically impossible. But it is almost certain that I was mistaken, and that the tumour was a chronic inflammatory mass involving the colon. Its exact origin is quite uncertain.

In addition to these cases I have also seen, in consultation with Dr. Henry White, of Bradford, a patient, a man aged sixty (?), upon whom colotomy was performed some years ago by one of the most distinguished of living surgeons, for intestinal obstruction due to a mass in the lower part of the sigmoid flexure or the upper part of the rectum—a mass which was supposed to be malignant in nature. The colotomy acted well, and to everyone's surprise the tumour gradually melted away, and eventually no trace of it could be discovered. The colotomy opening was then closed. Over a year

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later a tumour had again formed, and intestinal difficulty was so great that the re-opening of the colotomy wound was under consideration. But persistence with enemata relieved the obstruction, and the bowels began to act regularly again. The tumour, which was still perceptible, gradually disappeared, and for the last few years the patient's condition has been perfectly satisfactory.

The six cases here recorded have only afforded four specimens, but each of these is of considerable interest. Of the three other cases I think it is safe to say that, in the first two, no one seeing the conditions disclosed by the operations would have hesitated for one moment to declare that the tumours were carcinomatous. In the last case the diagnosis of carcinoma of the sigmoid flexure was made, and treatment based thereupon was carried out by an acknowledged expert. Yet the tumour disappeared completely, reappeared, and has again resolved.

The inflammatory tumours of the large intestine, excluding the tuberculous conditions, are, it would appear, far more frequent than we have supposed. The exact nature of the conditions present are not always the same. The inflammation may begin in and penetrate the mucosa; a false diverticulum may form and may be combined with a form of polypoid

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growth; or, finally, the inflammatory deposit may affect the peritoneal coat, chiefly or solely, leaving the mucosa supple and intact.

It is important to remember that the naked-eye appearance of the tumours in many of the cases is such that the mimicry of carcinoma is complete. Unless a careful microscopic examination is made, differentiation is impossible. It is accordingly not unreasonable to suppose that in some, at least, of the cases of "cure" after colectomy for carcinoma an error has been made of the kind to which I have drawn attention.

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2. See "Sigmoïdites et Périssigmoïdites," Saillant, Paris, 1906.
3. Jour. Amer. Med. Assoc., vol. i, 1906, p. 1585.

The Surgical Treatment of Cancer of the Sigmoid Flexure and Rectum, with Especial Reference to the Principles to be Observed.*

It cannot truthfully be said that the surgical treatment of carcinoma, occurring in the upper part of the rectum or in the sigmoid flexure, is at the present time entirely satisfactory. Two reproaches may justly be brought against it: the first, that removal is attended, in no small proportion of cases, either by regional or by distant recurrence; the second, that colostomy has to be performed, on account of the sacrifice of a large portion of the bowel, in perhaps a majority of cases. The position at the moment seems to be this: that if only so much of the bowel is removed as will permit of end-to-end anastomosis, an adequate excision of the parts, intestine, lymph-vessels, glands, and the tissues which bear them, can hardly be made; whereas, on the other hand, if these parts are freely removed, the performance of colostomy is compulsory. It is the

* Reprinted from *Surgery, Gynecology, and Obstetrics*, May, 1908, pp. 463-466.

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purpose of this paper to show that a free removal of the area involved is possible, and that with certainty in most cases, and with probability in all, an end-to-end approximation of the bowel is easily possible.

It is the first essential in all operations concerned with malignant disease that the removal of the parts shall be free, and that it shall follow certain lines. In the large intestine the growth itself must be removed, a length of bowel on each side of the growth, the lymph-vessels which drain the bowel, the glands in which those vessels end (all the primary glands, that is, and as many of the secondary as are accessible), and finally all the tissue in which those glands and vessels lie. In the case of the sigmoid flexure, and of the upper part of the rectum, this will involve a removal of the growth and of healthy intestine on each side of it, and the excision of all the glands which lie along the arteries as far up as the inferior mesenteric artery at its origin from the aorta. At the point where this vessel arises a lymphatic gland is always to be found; it lies along the artery before the origin of the left colic branch, and is the highest of the chain which, beginning at the intestine (in any part), extends upwards along the sigmoid superior hæmorrhoidal arteries to the inferior mesenteric trunk. Beyond this gland, the chain is continued into the glands which lie along the aorta.

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This gland, therefore, which lies on the inferior mesenteric, close to its origin, must be removed, and all glands which lie below it, if the necessary conditions just enumerated are to be fulfilled. In the removal the inferior mesenteric artery may have to be ligatured, either immediately beyond its origin, or after the left colic artery has been given off. Probably in many cases the gland can be stripped down from the vessel by firm wiping with gauze, after the peritoneum above it and on each side has been lightly divided. In two of my recent cases I have, however, found this impossible, and the artery at its origin has therefore been ligatured. This, for reasons presently to be disclosed, is not of the importance it might seem. The ligature on the artery is the summit of a wedge of material to be removed, the base of which lies at the intestine. The length of intestine which has to be excised is not a point to be specially considered, for though it may seem paradoxical, it is nevertheless true that the more freely the gut is sacrificed, the less likely is neurosis to follow, and the more certain is the end-to-end anastomosis to be successfully accomplished. In one of my cases, 14½ inches of the intestine were removed and end-to-end suture easily performed.

The two points of chief significance in the operation as I wish to describe it are:

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1. *The mobilising and displacement of the intestine:* This is carried out by making an incision through the peritoneum at the outer side of the mesosigmoid, at the points where this mesentery springs from the parietal peritoneum. The sigmoid together with its mesentery is then stripped up from the iliac fossa towards the aorta, the peritoneum on the inner side of the sigmoid being lifted off the posterior surface of the abdomen until the middle line is reached. This stripping extends well upwards and downwards, until the whole flexure and the upper part of the rectum are attached only by a leaf of peritoneum on the inner aspect. At a later stage of the operation, the descending colon and the splenic flexure are similarly mobilised, by incising the peritoneum to their outer side and above the flexure and by stripping the gut inwards to the middle line. The middle and left colic arteries are in the peritoneal fold, which now forms, as it were, a mesentery for the bowel. The result of this freedom of the intestine is that it can be quite readily drawn down so that the descending colon reaches well into the pelvis, and could, if there were need, be made to extend to the anus. In carrying out this manœuvre the transverse colon also may be loosened, so that its central V-shaped dip is straightened. The splenic flexure is normally, of course, fixed high up on the left side; in its altered

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position it is made to descend several inches. This procedure has to be performed before it can be realised how perfectly simple it makes this displacement or transplantation (if one may so term it) of the intestine. The result of it is that the bowel is rendered so free that it can readily be placed in such a position that the end of the descending colon can be brought into easy apposition with the divided rectum and union then secured by suture; and the vascular supply of the parts is secured by the preservation of the vessels in the peritoneal fold, by which alone the mobilised gut now remains attached.

2. *The condition of the vascular supply:* It might perhaps be supposed that the severance of the inferior mesenteric artery would deprive a large part of the sigmoid and of the descending colon of its blood-supply. This, however, is not the case. If the middle and left colic arteries be examined, it will be found that they anastomose at about two inches from the intestine, in a vessel which runs parallel with the bowel; from this artery straight branches pass to the intestine. That the circulation through this vessel is carried on quite freely after section of the inferior mesenteric may readily be demonstrated in any operation by loosening the clamp applied at the upper severed end of the sigmoid flexure; free hæmorrhage occurs at once. An

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examination of the vascular supply of the transverse and descending colons and the sigmoid shows clearly enough that the sacrifice of the direct supply to the left colic artery, by ligature of the inferior mesenteric, is not in the least likely to interfere with the easy transmission of blood through the vascular arch which the left colic makes with the middle colic above and with the sigmoid and superior mesenteric below. The important outcome of this is that the upper divided end of the sigmoid flexure, at whatever high point the division is made, is freely supplied with blood, even after the inferior mesenteric trunk has been divided.

These two points, then, make it clear that a great length of the bowel may be sacrificed and the normally fixed parts of the large intestine above the division be rendered so mobile that their transplantation is a matter of no difficulty; and, further, that the high division of the inferior mesenteric artery, made necessary by reason of its close relation to glands which it is imperative to remove, does not devascularise the upper end of the bowel which is to be engaged in an end-to-end anastomosis.

The precise details of the operation to be practised will depend upon the exact position the growth may occupy. I will first describe the procedure necessary

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in a case of growth about the middle of the sigmoid flexure.

The patient is placed in the Trendelenburg position and a long incision made in the middle line. A Doyen's valve-retractor now, or a little later in the operation, gives a good exposure of the pelvis. The intestines are packed away with swabs, only the rectum, sigmoid, and a part of the descending colon being at first visible. The sigmoid is lifted up from the posterior abdominal wall, and with the scalpel or scissors an incision is made in the peritoneum of the iliac fossa, immediately to the outer side of the mesosigmoid. This incision is continued down into the true pelvis, keeping close to the intestine, and up along the outer side of the descending colon. A piece of gauze wrapped around the fingers now strips up the mesosigmoid from the iliac fossa, and the separation is continued steadily towards the middle line. The ureter is to be displayed in all the length of the incision, so that its security is in no doubt. The spermatic vessels are also seen, and are carefully handled, to avoid damage to the vein, which tears readily. The freeing of the peritoneum on the inner side of the sigmoid and the descending colon is continued until the aorta is reached, and the inferior mesenteric trunk is recognised at its origin. The bowel is now quite freely movable and can be turned well over

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to the right, attached by a single leaf only of the peritoneum in which the vessels lie. This peritoneal leaf is translucent; by holding it up to the light the exact line of the vessels can be seen, and the position of many of the glands defined. The raising of the peritoneum with the bowel has been carried out in such manner as to leave the pelvic wall bare, all fat and glands and vessels are raised up with the fold of the serous membrane. Into the space made bare a large, hot, moist swab is packed. The inferior mesenteric artery is now surrounded by an aneurysm needle at its origin; it is tied in two places with strong catgut, and divided.* From this peritoneal wound two incisions are made, the one upwards towards that point where the sigmoid flexure or descending colon is to be divided, the other downwards over the aorta and along the front of the sacrum to the rectum at the place where its division is necessary. To meet the lower end of this peritoneal incision a continuation is made of the incision already begun on the outer side of the sigmoid. The two meet across the front of the rectum or the lower part of the sigmoid. The point of their union is determined by the position of the growth. At this stage all that is necessary to remove the wedge-shaped area to be sacri-

* If no gland lies on the vessel before it gives off the left colic, the ligature may be applied below this branch.

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ficed is the division of the intestine above and below. This is effected between clamps, after sedulous care has been taken to avoid infection. The liberated mass is then removed. It may be 10 inches long at its intestinal base, or even more. The free vascularity of the upper extremity of the bowel may be demonstrated by a slight loosening of the clamp. The approximation of the two ends of the intestine would now seem perhaps to be almost impossible, but the mobilisation of the descending colon and the splenic flexure will soon render their anastomosis easy. When, however, it seems likely that this displacement of the descending colon will be needed, it is desirable to carry it out before the intestine is severed so as to be certain of a perfectly aseptic operation field at the time. The end-to-end anastomosis is then completed in the usual way.

For a growth in the rectum the same principles apply. The highest gland in the lymphatic chain, that which lies on the inferior mesenteric artery, must be taken away. Nothing less will do. The inferior mesenteric artery must then be divided, either above or possibly beyond the origin of the left colic artery. The peritoneal incision begins to the left of the upper part of the rectum and the sigmoid, and both these are wiped upwards with gauze towards the aorta. They are rendered mobile before anything else is done. The in-

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ferior mesenteric is then divided, the peritoneum incised downwards over the front of the sacrum, the middle sacral artery ligatured, and the sacral hollow wiped clean by repeated applications of gauze, stripping little by little. When this has been done, the amount of freedom which it is necessary to give the descending colon must be ascertained, and be provided. End-to-end anastomosis, when the bowel has been severed, will not always be possible inside the abdomen, for probably only four or five inches of the lower part of the rectum remain. In such circumstances the upper end of the rectum is tied with a stout catgut ligature before division. After the removal of this growth, an assistant passes a pair of forceps into the dilated anus and seizes this tied end of the rectum, which is then inverted until the ligatured end can be made to protrude beyond the anus. The upper divided end of the sigmoid is then pulled through the anus with forceps and an anastomosis made by Maunsell's method. Many of the details of this procedure are the same as those laid down by C. H. Mayo.¹ The essential differences are, that in the method I describe the bowel above is freely mobilised, so that easy end-to-end anastomosis is possible, a greater length is removed, and the excision of the entire glandular group is ensured. It is probably safe to say that this last, and I think most essential, feature of

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the operation has never previously been suggested or adopted as a routine procedure. In the operations generally practised colostomy is performed too frequently. This serious drawback to the cosmetic attributes of the operation can be avoided, strange though it may seem, by a higher division of the arteries, and by a wider removal of the intestine, provided the principle of displacement of the colon be duly observed.

For low rectal cancer I have never carried out an abdominal operation, but if adequate measures are to be taken to remove the invaded area in accordance with the principles laid down, no other course than this seems rational. Operations which merely go "wide of the disease" do not meet the necessities of the case. We have not yet sufficiently realised that the surgery of malignant disease is not the surgery of organs: it is the anatomy of the lymphatic system. The inherent futility of all purely sacral operations seems to me to be quite evident. If it is true, as I have endeavoured to show, that the descending colon and the upper part of the sigmoid flexure retain their vitality after the sacrifice of the inferior mesenteric artery, and if the mobilisation of the colon and the splenic flexure permit a considerable displacement of these portions of the bowel, then in all cases of carcinoma of the sigmoid

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flexure or of the rectum, whether high or low (the proctodæum excepted), an abdominal operation seems desirable, for by this route alone can the whole lymphatic territory be extirpated. The observance of the practice described in this paper should do much to abolish the operation of colostomy as a necessary part of the radical operation for cancer; though it will, of course, always be demanded for those cases in which obstruction calls urgently for relief.

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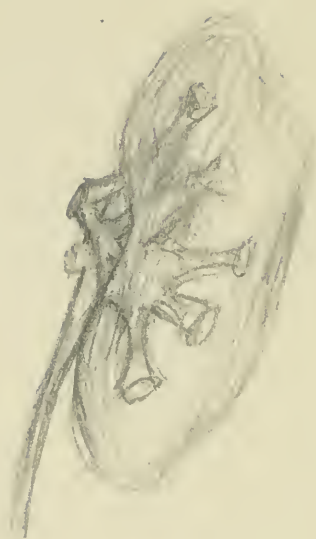
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